

32/4

WORKING BULLETIN

FOR THE SCIENTIFIC INVESTIGATION OF

QUEBRACHO,

(ASPIDOSPERMA QUEBRACHO.)

A Plan to promote Progress in the Science of Pharmacology.

This working bulletin, accompanied by the drug to be investigated, or a preparation of the same, both, as the circumstances require, is distributed gratuitously to the Colleges, Universities and other institutions engaged in scientific work, and to the government hospitals, and public hospitals and dispensaries, and to the medical profession at large, to obtain the results of the drug in treating the sick.

The object is to promote original investigation in the science of drugs. This we propose to do by furnishing gratuitously to those engaged in original research, material for investigation, and by publishing the results of the same as a donation to scientific literature. It is apparent that the only return which we can receive for this work is the increased demand for the valuable drugs which we are introducing to science, for we guarantee to publish full reports, favorable or otherwise.

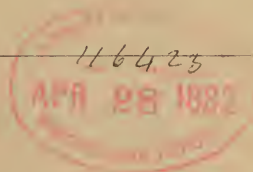
Articles in relation to the drug, under the following heads embraced by the pharmacology, are requested for the THERAPEUTIC GAZETTE, the organ which represents this new system of work. These heads form the classification of this bulletin. In regard to each drug investigated we solicit reports for publication upon the subjects of scientific name; synonyms; definition; natural order; botanical origin; history; commerce; production; cultivation; description; microscopical structure; chemical composition; uses (in medicine); adulterations and substitutions; pharmaceutical preparations and dose; antagonists and incompatibles; synergists physiological action; therapeutic properties; toxicology and antidotes.

At the end of the year the reports published in the GAZETTE will be collected, classified, and published in the form of an ANNUAL REPORT, which will be donated to the libraries of the Smithsonian Institute, a government institute at Washington for the free diffusion of knowledge; and a sample of the drug, and our preparation of it, will be deposited in the National Museum, in the department delegated to pharmacology.

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ASPIDOSPERMA QUEBRACHO.

Quebracho bark, Quebracho Blanco.

The bark of the tree of Aspidosperma Quebracho.

Natural order, Apocynæ.

Botanical Origin.—(Report from Dr. Adolph Hansen, assistant at the Botanic Institute of Erlangen, contained in an essay by that author.—Therapeutic Gazette, September, 1880; p. 263.) The genus *Aspidosperma* belongs to the Apocynæ. The general peculiarities which distinguish the members of this family are astringent properties, aromatic resins and the property of furnishing a milky juice, at times innocuous, and at others, again, very poisonous. The genus *Aspidosperma* was originated by Martius and Zuccarina. In the first volume of the Nov. gen., De Candolle, Prodr. VIII, p. 396, ff., there are two sections of these plants described, containing eighteen species. In the essay of Müller von Aargau on the Apocynæ of the Flora Brasiliensis, we already find described thirty-nine species, likewise divided into two sections. Three species mentioned by De Candolle occur beyond the north-western limits of Brazil. Further, four extra-Brazilian species are described by Müller von Aargau in Vol. XXX., Linnæa, p. 397, as occurring in British Guiana, on the Orinoco, and the Island of Trinidad, and in the forests of Mexico, so that in all forty-six species are known. The species discovered by Burmeister, Schlechtendal was unable to identify with any of those already known, and consequently *Aspidosperma Quebracho* must be added to the above number as an Argentinian species.

Aspidosperma Quebracho is a tall tree with a perfectly straight trunk from two to three feet in thickness, with a moderately large oval crown and sparse foliage, the extreme twigs being very fine and pendant, as in the willow (something like *Salix Babylonica*). I received from the Göttingen Herbarium specimens of *aspidosperma quebracho*, collected by Lorentz and Hieronymus; they consisted of blossoming twigs from plants of first year's growth and over, and also of the fruits. It seemed to me to be of interest to furnish an exact illustration of a flowering twig, inasmuch as *aspidosperma quebracho* has not yet been illustrated. (Plate I, fig. 1.) The leaves stand in triple whorls, they are leathery, lanceolate, entire, smooth, veins not prominent, the upper and lower sides both presenting the same appearance. The leaf ends in a sharp-pointed thorn. The inflorescence is rather complicated, the flowers are in cymes which have the forms technically termed dichasia or pleiochasia, or sometimes the arrangement resembles the helicoid cyme. The calyx is pentasepalous, the corolla pentapetalous; the petals overlap each other at the base (fig. 1 b); five stamens are attached to the corolla; ovary superior, two-celled, with numerous ovules, the pistil carrying a headed stigma (fig. 1, a b c). The fruit has been accurately described and figured by Schlechtendal,* to whose illustration I refer. It may be noted that its anatomical structure bears a remarkable similarity to that of the bark, inasmuch as the parenchyma of the former is also interspersed with sclerogenous cells.

Remarks on Species.—Grisebach gives the following diagnosis of the species. (*Plantæ Lorentz*, p. 203).

Aspidosperma quebracho Schlecht. Simile *A. parvifolio* A. DC. sed foliis oppositis (ternatimque verticillatis) a charactere generico aberrans corollaque aliis speciebus accedens.

Arbor sempervirens, glabra, ligno duro, foliis rigidis glaucescentibus elliptico-lanceolatis subsessilibus v. in petiolum brevissimum attenuatis utrinque lævigatis subvenosis margine calloso flavente cinctis apice aristato-mucronatis (1" longis 3-4" latis, cymæ axillares et terminales, trichotomæ (1" diam.), pedicellis patentibus pedunculisque minutissime puberulis, 1-2" longis, calyx 5 partitus ½" longus, segmentis ovatis acutis, corolla, lutea, ad medium 5 fida, tubo cylindrico 2" longo, lobis expansis oblongo-linearibus obtusis basi auriculata sinistorum contortis; antheræ infra faucem sessilis, deltoideo-cuspidatæ; ovaria 2, stylo communi incluso superne clavato minutissime 2 cuspidato; capsula lignosa, margine convexa compressiuscula, elipsoidea 2½" longa, 1½" lata, 10" crassa, valvis medio carinatis; semina cum ala lata 2" longa, 1" lata.—Cordoba, in campis pr. urbem, inde per provincias Santiago de Estero et Tucuman.

In comparison with the species mentioned and illustrated in the Flora Brasiliensis (Vol. vi, part I), *aspidosperma quebracho* assimilates closely to several different varieties. In its inflorescence it approaches most nearly to *aspidosperma nobile*, *pyrifolium*, *subincanum* and *tomentosum*. In its venation it resembles *aspidosperma parvifolium*, differing, however, by the verticillate arrangement and thorny point of the leaves.

*Bot. Zeit., 1861, p. 138; plate V. B.

History.—Report from Dr. Adolph Hansen, assistant at the Botanic Institute of Erlangen, contained in essay by that author.—*Therapeutic Gazette*, September, 1880; p. 263.

Soon after the introduction of quebracho bark, this remedy attracted considerable attention. The limited knowledge we possessed of the drug itself, and the difficulty of obtaining it, as well as the occurrence of frequent substitution of false varieties for the true drug, caused considerable confusion, which was not in the least diminished by numerous communications of results obtained from all kinds of barks. A large number of short notices of the bark and its therapeutic effects appeared in the medical and pharmaceutical journals without, however, a report of any thorough examination of the bark itself. The only serviceable reference was contained in a description by Dingler, appearing with Fraude's chemical publication. As I was in possession of material of undoubted genuineness, it appeared to be of sufficient interest to furnish an elaborate description of the bark, above all in a pharmacognostic sense, thus enabling us to identify it and render further substitution impossible.

An examination of the wood was undertaken at the same time with that of the bark.

The work, which was begun in the interest of therapeutics, brought ample reward in the discovery of several anatomical peculiarities.

All the illustrations are drawn from nature; the accompanying number designates the microscopic enlargement.

ERLANGEN, May, 1880.

In the beginning of the year 1878, Herr F. Schickendanz sent a collection of vegetable drugs from the Argentine Republic to Erlangen for examination and valuation. Among these samples was a bark which has since then attracted considerable attention; a member of the apocynæ *aspidosperma quebracho*, Schlechtendal.

Attention was attracted to this bark principally by the comments of Schickendanz; he wrote: "*Aspidosperma quebracho* is a tree occurring quite commonly in the province of Santiago, and in the bosom of the valley in which the city of Catamarca is situated. I know of only one group of these trees, on this side of the Ambato, standing near the outlet of the Quebrada-del-Molle, about four leagues east of Pilciao, whence the bark is obtained. The tree belongs to the order apocynæ and was named by Schlechtendal *aspidosperma quebracho*. The bark has been in use for many years as a febrifuge, and, according to the views of the physicians of Tucuman, is equal to the cinchona barks in activity." The great importance of the cinchona barks and their alkaloids as curative agents made it a matter of the first importance to determine the correctness of the views which ascribed to quebracho an equal rank and value.

During the period in which the chemical examination was progressing under the direction of G. Fraude* at the Munich laboratory, other experiments to determine its therapeutic action were instituted by Dr. F. Penzoldt. The former resulted in the discovery of an alkaloid which seems, at least theoretically, related to the cinchona alkaloids, while the latter researches brought about a knowledge of the wonderful efficacy of the remedy in dyspnœa, though the praise awarded to it for its antifebrile properties was not found justified.

This unexpected action of quebracho bark at once elevated it to the rank of valuable remedies, though the suddenness of the discovery was attended by a dearth of further material, the original shipment containing only limited quantities. The natural consequence was an eager attempt to obtain parcels of the drug, which was difficult enough, inasmuch as jobbers and druggists possessed no acquaintance with the article sufficient for its identification,† and besides it must necessarily be obtained from a foreign source.

The limited knowledge available regarding its botanical source gave rise to much confusion and variation in the parcels brought into the market, which again threw doubts on the correctness of the pharmacological discovery. This state of uncertainty was greatly aided by the fact that in its native country, species of entirely different families received the popular designation of "quebracho."

The word itself, composed of "quebrar" and "hach," signifies "breaking the ax," and trees with very hard wood commonly received this designation without regard to their application in a scientific way, a circumstance frequently occurring in our own country. It is, therefore, an imperative necessity to establish the identity of the sample obtained from the first sender, which will be greatly assisted by a study of the history of this plant, which possesses, in fact, an ample though somewhat scattered literature. Through the extended travels and thorough researches of Martius,‡ in which he was aided by a complete equipment of apparatus and material, and which have, not unjustly, caused him to be named the second discoverer of Brazil, we have been placed in possession of an extended knowledge of the vegetation of that country. An imposing evidence of this fact is found in the "*Flora Brasiliensis*" begun by Martius and numerous other botanists, and continued by Eichler. The great neighboring territory of the pampas has been as yet but slightly explored botanically. By pampas we usually understand the treeless plains of South America, overgrown with giant grasses, such as stretch in unmeasured grandeur from the La Plata to the Rio Colorado. In a botanico-geographical

*G. Fraude, *Berichte d. Deutch. chem. Gesellsch.*, 1878, p. 2189, 1869, p. 1558 u. 1560.

†F. Penzoldt, *Berl. klin. Wochenschr.*, 1879, N. 19.

‡Martius and Spix, *Journey to Brazil*. Munich, 1824-31. Vol. 3.

sense, however, the term "pampas" includes the entire area of country between the southern boundary of Brazil to near the southern terminal point of South America; it embraces, therefore, the La Plata states and Patagonia.

Of late years the Argentine Republic has endeavored to aid in the development of this section* by the appointment of German naturalists for the purpose of exploration, so that we may indulge the hope that this rich country may be opened up to the civilized world. An evidence of these labors is found in the publications of Burmeister and Grisebach. Several descriptions of the different plants indigenous to the pampas can be found in a history by A. Jacques,* of a military expedition undertaken against the predatory bands of Indians who had ravaged the extreme southern settlements of the Argentine Republic. Among the plants mentioned, of which short characteristics are given, we find the following:

"Quebracho, two varieties, the white and red, differing from each other not only in the color of their wood, but also in the structural peculiarities of the flower and fruit. The small, glistening, pointed, myrtle-like leaf is not deciduous in winter, the green color merely deepens, and new leaves of a more delicate shade sprout from the ends of the twigs; the intense solar heat, however, causes them to fall in summer. Its wood is of extraordinarily close texture and hardness, so that it may be used to replace the iron of wagon axles and the rollers used for crushing sugar-cane."

The extended travels of Burmeister† through the La Plata states were, then, the means of giving the first important information as to their botanical and general conditions. While on this journey, Burmeister met with quebracho, and through him the first specimens of the fruit and twigs of this tree were sent to Europe. It will, perhaps, be of interest to quote from Burmeister's own words a description of the discovery of this tree, which I take from his report. At this time he was on the road from between Cordova and Tucuman:

"July 19th. Our departure from Chafar took place at night. As the sun rises we are already at the first station beyond, Pozo-del-Tigre, a distance of four leguas. Our surroundings were low woods with groups of palms, as heretofore, without anything characteristic. Two leguas beyond Pozo the palms ended, and were replaced by low bushes of an unfamiliar species of syngenesia, with fine reversed, heart-shaped leaves, such as were found at Mendoza. In this manner we arrived at Portezuelo, five leguas from Pozo, lying between high, rounded, bare, granitic hills, on the banks of a clear brook. The appearance of this spot made a most peculiar and horrible impression on me, so wild and weird was its character; we found, however, a friendly family who shared with us their breakfast, which was then waiting. At this point we had entered the province of Santiago-del-Estero, reported to be 620 metres above the level of the sea; it is four leguas from here to Orquetas, the next station. The landscape still produces a very melancholy impression; it is covered with low shrubbery between the constantly occurring naked granite rocks. Farther on we met with a few large species of cactus; opuntias of giant form and tall trunks; still further on the landscape becomes more picturesque by the appearance of a tree characteristic of this region as far as Tucuman, viz.: Quebracho. The tree presents the appearance of an erect high trunk carrying a spreading crown whose drooping extremity bears finely pointed twigs. As I was unable to determine the plant botanically, at this time, I collected several of the rather numerous oval fruits, an examination of which has since resulted in the discovery that the specimens belong to the order apocynæ, genus *Aspidosperma*, Mart., and is, without doubt, a still undescribed variety. This tree is of great commercial importance to the country on account of the value of its wood, which is used for building purposes, particularly the variety which is known as "Quebracho Colorado," whose wood, of extreme hardness, is of a blood-red color, which in course of time becomes quite black, while the other variety, known as "Quebracho Blanco," remains white. The leaves of the former are small, fine, simple lanceolate, while those of the latter are broader and ovate-lanceolate. In this beautiful forest of quebracho I was taken so sick that to my regret I was unable to pay further attention to my surroundings. I merely know that the region as far as the Rio Dulce was of the same character, on both sides of which a low meadowy vegetation extended, intermixed with salicornias, the soil strongly impregnated with salt, and further on a repetition of the quebracho forest, now interspersed with numerous individuals of a species of *cereus* of high candelabra-like forms, which emerged from the bushy undergrowth and reached to the crowns of the quebracho trees. Both were, however, distributed at intervals, and did not form an unbroken forest."

Thus far Burmeister's account of quebracho. Being himself unable to determine the plant, he sent a number of twigs and fruits to Schlechtendal. The fruits bore an undoubted resemblance to those classified by Martius and Zuccarini as *aspidosperma*. They were identical with the fruits illustrated as belonging to the genus *aspidosperma* in Martius' Nov. gen. et spec., plate 1, 34 and 36, and in the Flora Brasiliensis fascic. 26, plates 13 and 15, and show only a slight diversity of form and flexion. The fruit will also be found illustrated in the Botanische Zeit., 1861, plate 5. Although no sample of quebracho Colorado was obtained from Burmeister, nevertheless Schlechtendal concluded that both plants must belong to the same species, having the same vulgar name, and consequently classified them as

*Excursion au Rio-Salado et dans le Chaco, Confédération Argentine. Par Amédée Jacques (Extrait de la Revue de Paris, du 1 et 15 Mars, 1857) Paris, 1857.

†H. Burmeister. Travels through several northern provinces of the La Plata states. Zeitschrift f. allgemeine Erdkunde N. F., 1860. Bd. IX.

belonging to the genus *aspidosperma*. He named the one *aspidosperma quebracho Blanco*, and the other *aspidosperma quebracho Colorado*. This error referred to by Grisebach,* gave rise to much confusion, until removed by the receipt of further material for examination.

Succeeding Burmeister's researches was the important journey of Lorentz, in the northwestern part of the La Plata States, which had been the least explored. This journey, which was undertaken at the instance of the Argentine Republic, materially aided botanical science in that country; it occurred during the years 1871-72, and included the provinces of Cordoba, Santiago del Estero, Tucuman and Catamarca, lying between 26° and 31° south latitude. Inasmuch as Lorentz was not in possession of the necessary scientific appliances, he transmitted the material collected to Grisebach, and the latter published the results of his investigations in a large treatise entitled "*Plantæ Lorentzianæ*."† Among this collection were a sufficient number of specimens for examination of both plants, *quebracho Blanco* and *quebracho Colorado*, so that it was possible for Grisebach to determine and correct the error previously made by Schlechtendal with reference to the latter species. It was discovered that the plant known in the Argentine Republic as *quebracho Colorado* belongs to quite a different family than *quebracho Blanco*. The first named tree does not belong to the genus *Aspidosperma* nor even to the *Apocynæ*, but is a member of the *Terebinthaceæ*, and is to be classified under the genus *Anacardium*. Inasmuch as Schlechtendal's classification has thus been proven incorrect, it was named by Grisebach "*Loxopterygium*, Gr." It is described on page 115 of the "*Plantæ Lorentzianæ*"; Schlechtendal's classification of the *quebracho Blanco* was, however, found correct, and it therefore retained that name.

In a second treatise o. Grisebach's,‡ on Argentinian plants, occurred other descriptive notices, which removed all possible sources of error. On page 224 it is stated, according to a communication of Hieronymus, that *aspidosperma quebracho* obtains in the entire country the title of "*quebracho Blanco*," and not "*quebracho Colorado*." Further, it is mentioned in the same treatise, p. 95, as an appendix to a repeated diagnosis of *loxopterygium*, that also, in accordance with the statement of Hieronymus, the popular name of "*quebracho Colorado*" is used in both the provinces of Tucuman and Santiago del Estero to designate only *loxopterygium*.

In entire accordance with the foregoing are the statements most recently made by Hieronymus in Cordoba, who is the best authority on this subject. These latter were communicated by Herr Primke in No. 9 of the *Pharm. Zeit.*, 1880, which I quote verbatim:

"As *quebracho*, are designated the following trees belonging to different families of plants, and their parts which are of commercial value as raw material:

1. *Aspidosperma quebracho Schlechtendal*, *apocynæ*, local name, *quebracho Blanco*. This tree grows in the province of Catamarca, of the Argentine Republic; the bark is used by the natives as a remedy for malaria and asthma.
2. *Loxopterygium (quebrachia)*, *Lorentzii*, Gr., *Terebinthaceæ*, local name, *quebracho Colorado*. The wood and bark are found in commerce, and valued as an excellent tanning material. This tree grows particularly in the province of Corrientes.
3. *Jodina rhombifolia*, *Hooker et Arnott*, *Ilicinæ*, local name, *quebracho flojo*. The wood and bark frequently occur in commerce, and are often mistaken for No. 2.
4. *Machærium fertile*, Gr. *leguminosæ dalbergiæ*, synonym, *tipuana speciosa*, local name *tipa*. This tree also furnishes wood and bark for tanning purposes, both of which, however, are of less value than No. 2.

It is of little importance to consider the possibility of the latter tree being mistaken for *quebracho*, as Grisebach, who mentions it as *Machærium Tipa Benth.*, in his "*Symbolæ*," p. 109, has already remarked that Bentham had determined, on the authority of Mantegazza, that the naming of this species "*quebracho Colorado*," was evidently an error, the name "*tipa*" being preferred by the inhabitants of Tucuman for its greater fluency of pronunciation. There remains then no room for doubt that the species of plant to which *quebracho* bark owes its origin is *aspidosperma quebracho Blanco*, Schlechtendal, the latter being a positively determined species, and even in its native country is with difficulty confounded with others. The present state of confusion is therefore to be ascribed to the limited knowledge possessed of the new drug.

*A. Grisebach, *Vegetation of the Earth*, vol. 2, p. 620, 1872. "We distinguish two varieties of *quebracho*, *Blanco* and *Colorado*. Schlechtendal examined the fruits of *quebracho Blanco* and referred them to the genus *Aspidosperma* of the tropical *Apocynæ*. According to his illustration the fruits are identical; as the flower, however, is unknown and the leaves occur in whorls or are opposite in this specimen, and in the determined varieties are alternate, the classification still requires further substantiation. A decided error, however, was committed by him in classifying *quebracho Colorado* as belonging to this species, seemingly without being in possession of specimens and regardless of the fact that these have not the flat two-lobed capsules of the *aspidosperma* according to the description of Tweedie (*Ann. Nat. Hist.* 4. p. 101), but bore large clusters of red fruits similar to those of the sycamore (*Ficus*). The fact that the designation "*quebracho*," really "*quebrar hacho*" (breaking the ax) refers to the hardness of the wood and not to any special family of trees, seems to be confirmed by Orbigny's report on Corrientes, who includes therein also a species of *Acacia*."

†*Plantæ Lorentzianæ*. Description of the first and second collections of Prof. Lorentz at Cordoba. Publ. by the Imper. Society of Sciences at Göttingen. 1874; p. 49.

‡*Symbolæ ad Floram Argentinianam*. Second descriptive treatise on Argentinian Plants. Publ. by the Imp. Society of Science at Göttingen. 1879; vol. 24.

Report of Prof. J. Weisner, of Vienna, contained in article translated from Prager Medicinische Wochenschrift, Therapeutic Gazette, (January, 1880, p. 13.) Quebracho means literally "axe-break ing," therefore, "Tree of hard wood." Two kinds of the drug were presented at the International Exhibition: Q. Colorado (also called rosado) and Q. Blanco. The former is derived from a Terebinthacea; Loxopterygium Lorentzi Griesb; the latter, as mentioned before, from an apocynacea: aspidosperma quebracho. The very hard and heavy wood of the latter forms a good tanning material and contains about 18 per cent. tannic acid, which is, however, not identical with that of the oak bark or oak wood. On account of its cheapness it has been imported lately in larger quantities for purposes of art.

Report from Mr. O. Primke, Pharm. Zeitung, New Remedies, (Therapeutic Gazette, Aug., 1880, p. 238.) Mr. O. Primke lately sent a communication to the Pharm. Zeit., in which he draws attention to possible mistakes which may arise from a misinterpretation of the name quebracho. The latter is a Spanish word and means "iron wood." There are four different trees which yield, in commerce, quebracho-wood and bark; hence a confusion might easily arise.

Mr. Primke received this information from Mr. Hieronymus, Professor at the University of Cordoba, who also furnished him with specimens of the wood and bark of the aspidosperma quebracho, which corresponds in every respect with the pharmacognostic description of the bark given by Dr. Dingler, Custos at the Botanical Garden of Munich.

Description.—Appearance of the bark when viewed through a lens: The material which served for this examination was a portion of the first consignment received from Schickendanz. Through the courtesy of Dr. Dingler I was also placed in possession of material in his own hands, and still further a transverse section of the trunk with bark attached was kindly transmitted by Dr. Penzoldt, who had received it from Prof. Hieronymus in Cordoba. During the course of the examination I received still other samples for comparison from different sources.

The bark occurring in commerce is obtained from trees usually averaging from seventy to eighty years of age. The pieces have a thickness of 20–30 mm. Bark of younger trees which are devoid of corky layer, is seldom found. Quebracho bark is distinguished by a peculiarly heavy development of the corky layer in proportion to the entire dimensions of the bark, possessing therein an important characteristic feature as compared with other barks. This corky layer makes such inroads into the tissue that in most cases half, and frequently more, of the entire substance of the bark consists of this layer. The external appearance of the corky layer differs from the unchanged tissue beneath it very markedly and distinctly.

A transverse section through an entire piece of bark, made so that a very smooth surface is obtained for examination, reveals the following appearances, with or without the aid of a lens. (Plate 1, fig. 2.) Two layers differing remarkably in color and structure, separated from each other by sharply defined boundaries, and which are usually nearly equal in width. (Fig. 2. r. and b.)

The outer layer (b.) is deeply fissured, and rough, with numerous ridges, while the inner one (r.) presents to view a band of tolerably uniform width. The first glance shows that these layers are not of homogeneous composition and a magnifying glass indicates prominent differences of structure. We will first consider the external or corky layer. The outer portion is of a dirty gray, covered here and there with remains of lichens; when the external grayish portion is removed by friction, it appears yellowish-red, (plate 1, figs. 2 and 4). The transverse section shows the cortical layer to be of an ochreous yellow color. Sinuous bands of tolerably uniform width traverse its tissue in lines of nearly parallel direction. Between these dirty yellow lines we find numerous whitish points interspersed through the mass. (Plate 1, fig. 2). The inner section of the bark which represents the fibrous layer, (r. fig. 2,) appears to be composed of only two ingredients, a clove-brown mass in which, as in the bark, there are numerous whitish grains. All these conditions can be more plainly observed on moistening the surface with water. While the corky layer obtained from different trunks presents a uniform appearance, the color of the inner layer may vary considerably. The brown color varies in shade from light to dark, frequently replaced even by light yellow, or yellowish-white. A piece of bark of this description is illustrated in fig. 3. The cause of the difference will appear from a microscopic examination. The inner bark crumbles easily when cut; the portion nearest to the trunk possesses a fibrous splintery texture.

The foregoing descriptions and a comparison of the illustrations will show that the identification of the bark is a comparatively easy matter, inasmuch as it bears no resemblance to other known barks. Of special importance for this identification is the outer corky layer, on account of the constancy of its color and structure.

Microscopical Structure.—A separate examination of the corky layer and inner bark will also be found most serviceable here. As is well-known by the term "corky layer," we understand the structure, which, in consequence of the dying-off and drying out of successive layers, is separated from the inner bark or cellular layer. When this dead cellular growth remains adhering to the trunk it is finally rent asunder by expansion of the latter, and thus gives to an aged one a rough and fissured appearance. Such layers may be formed successively, and thus increase the depth of the corky portion; in Quebracho this tendency is displayed to a marked extent. A microscopical examination of a thin section of the corky layer shows these relations, (Plate 1, fig 5). p. is the original cellular tissue

composed of parenchymatous elements; it is traversed at varying distances by bands of different width (k.); the cells of these intersecting bands differ remarkably from the original parenchyma of the bark. Owing to their smaller dimensions and their regular order they are characterized as "cork cells," these cork layers may often be detected with a lens, on a section of the bark forming the above mentioned parallel lines which intersect the red corky layer. That portion of the bark-parenchyma, lying between these corky bands (p. fig. 5) is that which presents itself to the naked eye as a reddish-yellow groundwork of the structure. This reddish-yellow shade is caused by the coloration of the cellular membrane which contains a coloring matter varying between reddish-brown and carmine-red. It will be noticed at the same time that the membrane of the cork cells is uncolored and, therefore, exhibits a decided difference when examined with a lens. Inasmuch as the cells of the original bark-parenchyma, existing in the corky layer have died, they contain nothing except remnants of former components. It now remains for us to determine the structure of the whitish points observed in the corky layer when viewed microscopically; as they always lie between the cork bands, we should be able to discover them in fig. 5, plate 1. A glance at this enlargement will show cell groups of peculiar structure existing in the parenchyma enclosed between these bands, resembling islands lying in the web itself (fig. 5, sk.); these grains are nothing else than groups of cells whose membrane has thickened to such an extent from secondary deposits that the cavity has become nearly filled. Owing to the difference in their refracting power with regard to light, these groups of sclerenchymatous cells appear quite prominently and distinctly against the ground-work. In the inner bark we also meet with these cells, and under that head they will be considered at greater length. The microscopical inspection of the corky layer presents a very characteristic view; the repeated cork bands and groups of sclerenchyma render the identification of the bark an easy matter. When we examine the inner layer (r., fig. 2) we should be able to discover the same elements which are transformed by secondary processes into the corky layer with the exceptions of the cork bands.

This is confirmed by an examination of the section (plate 2, fig. 6) which represents about a third of the width of the brown fibrous layer, being, in fact, the inner portion, which was originally in direct contact with the wood. The components of the layer are brown-walled parenchymatous and sclerenchymatous cells lying partly isolated, but again occurring in groups. The parenchymatous cells vary in size; their walls are thickened unevenly and irregularly, and are of a cinnamon-brown color* by which the dark appearance of the layers is caused; the cells are rich in starch and a light-brown granular substance. The entire structure appears to be distorted and disorderly; a close examination, however, will enable us to discover in this confused mass, the medullary rays radiating through it. At many points, especially in the medullary rays, we can discover blackish, thread-like formations consisting of the mycelium of a fungus which has penetrated into the dry bark. The groups of sclerenchymatous cells display the same components as those in the corky layer, their form and appearance being alike in both cases (fig. 6, sk.,) differing only from the latter by containing a dark yellow substance, by occurring in the form of drops, filling up both the cavity and the pore-canals of the cells. It is difficult to determine anything with regard to the chemical nature of this substance; it is insoluble in water, alcohol and ether; treated with potash lye, it dissolves; but it is not possible to remove it entirely from the cells; solution of ferrous salts gives no precipitate, an evidence that it is not an astringent substance. Fig. 7 represents a group of sclerenchymatous cells, surrounded by brown-walled parenchyma which shows that the group is not of homogenous structure, but is composed of two different elements discoverable at the first glance. In this group, there are several cells which are conspicuous by their peculiarity of appearance, readily distinguishable from the prepondering mass. The larger number of these sclerenchymatous cells have a flattened form, resulting from their mutual pressure. These cells are nearly isodiametric, their walls much thickened, and the layers therein easily distinguishable. The cavity has nearly disappeared, and numerous pore-canals reach from it into the thickened wall. These cells are, therefore, so-called "short sclerenchyma," (stone-cells). The second class of cells above referred to, differs in one particular from the remainder, in that they have a nearly circular form. The cavity of these cells has almost entirely disappeared, having contracted to a point in their centre; the thickened wall of these cells is penetrated by very fine pore-canals, frequently indistinguishable. A further inspection shows that these cells occur not only in the groups of sclerenchyma but also appear isolated in large numbers in the parenchyma.

A remarkable feature of these cells is that their periphery is surrounded by a wreath or ring of angular bodies, which refract light in a different manner from the cell-wall. In order to arrive at a thorough knowledge of the structure of these cells they should be viewed longitudinally; there is no difficulty in preparing a specimen for this purpose; an examination thereof discloses the fact that they are fibres of sclerenchyma which have a considerable length and are spindle-shaped at the ends. (Plate 2, fig. 8). The number of these isolated fibres increases in proportion as we near the inner part of the bark, the splintery structure of this inner portion depending upon the frequency of their occurrence. On

*As has already been remarked some specimens of the inner layer have a much lighter color, (Fig. 3 r), which is owing to the fact that in such pieces the cell wall of the parenchyma is uncolored. While there is no difference in structure between the lighter and darker shades, it seems that the brown coloration of the walls occurs only in aged trees, and is, sometimes entirely wanting,

scraping the inner portion of the bark with a knife, a microscopic examination shows that we have separated such fibres almost all together. As these fibres are so characteristic of quebracho bark, of such value for its identification and of such peculiar anatomical structure, we will consider them at greater length. Naturally, we can obtain from a transverse section of the bark quite a number of sclerenchyma fibres which usually separate spontaneously from the surrounding tissue. Such an isolated section of the fibre always displays the surrounding circle of angular bodies, from which we may conclude that this substance is firmly attached to the fibre. It soon appears that these bodies are crystals and the question arises in what manner they are connected with the fibre itself; this is shown quite plainly by a longitudinal view of the fibre, (fig. 8,) in which we discover that the fibre is completely surrounded by an envelope of this substance, and is actually enclosed in a sheath composed of a multitude of small cells, each containing a crystal. It is sometimes possible to remove this sheath with a knife, which then reveals the spindle-shaped fibre surrounded by its envelope. (Fig. 9.) That the crystals are not merely adherent to the exterior of the fibre, but are really enclosed by cell-walls can be demonstrated satisfactorily by coloring one of these fibres with aniline or iodine, and removing the superfluous coloring matter by washing well with water. By this means the cell-wall alone absorbs the dye, the crystals remaining colorless, which can then be clearly distinguished from the former, an illustration of this being found in fig. 10. The crystals are composed of oxalate of lime, for on treatment of the fibre with hydrochloric acid the crystals may be dissolved, leaving the cells empty. If the fibre be now colored with iodine, or aniline, it can at once be discovered that it is surrounded by minute cells, (fig. 11). That these surrounding cells do not belong to the membrane of the fibre itself, will appear from a consideration of their origin and development given further on. Similar formations though not always of such complicated structure as the foregoing, exist in the bark of many plants; they have been designated by the name "crystal sheath;" an especial reference to their occurrence can be found in the article by Sanio in the Monthly Reports of the Royal Academy of Sciences, Berlin, 1857, p. 252, and also in De Bary's Anatomy, pages 104, 502, 544.

History of Growth and Development.—Living specimens of the *Aspidosperma* Quebracho were not accessible, to my regret, and for this reason I had to be satisfied with the material obtained from the Herbarium, but could at least obtain therefrom some knowledge of the development of the bark and its elements; to these observations are appended also a few anatomical details of the pith, which is remarkable for the peculiarity of its structural development.

The young shoots form wood early, so that one of a year's growth, at the end of the period of its vegetation, already possesses a firm woody ring, though the shoot may be but a millimetre in thickness, even the formation of the periderm having begun, as is shown by the appearance of the first corky layer. That the structural arrangement does not, as a whole, differ from the normal type of dicotyledons is shown by a transverse section of an internode in its earliest development. (Plate 2, fig. 15). Commencing at the centre, we find that from the pith there leads to the wood an irregular tissue of narrow cells, and in the wood may be discovered young wood cells, partly with thickened walls, and also young vessels. The bast tissue (figs. 16 and 17), of the vascular bundle is rather limited in quantity, its elements being principally cambiform cells of triangular or multangular section. As is well known, the bast of the *Apocynæ* is noted for its irregularly grouped elements, and very narrow, hardly discernible, sieve tubes. The bark displays in its earlier stages a complex structure.

For the following compare fig. 15: The epidermis, whose cells possess strongly cuticularized outer walls and develop short, hairy formations, is exposed to the risk of dying off by the occurrence of cork cambium in the adjacent cellular tissue of the hypodermic layer. The hypoderma is composed of globular cells with uniformly thickened walls.

Centripetally the cells of the bark become thinner. The inner zone of the bark surrounding the bast is noteworthy; in this zone are found two elements differing from the fundamental tissue; one is the primary sclerenchyma fibre known by its small cavity arising from secondary deposits (sf.), and the second, cells mostly oval on their transverse section, and differing by their greater diameter from their remaining bark cells; they surround the bast irregularly in large numbers, or are themselves lying therein.

These cells possess characteristic features both of form and contents; they are entirely filled with an amorphous substance, which in thick layers appears gray, and whose reactions indicate a fatty or waxy substance. It is colored intensely by tincture of alkanet, but potassa produces no effect, while ether dissolves it slowly. These secretory vessels are not of a globular form, as might be inferred from the transverse section (figs. 15 and 17 b.), inasmuch as a longitudinal section shows their form to be that of a duct of considerable length. Two of these superincumbent tubes are separated by a horizontal wall, making it seem as if they had originated from the division of a single cell. It was, however, impossible for me to determine the exact method of their formation, as those found in the youngest samples of material accessible to me had already arrived at maturity.

In older shoots the sclerosis of the bark cells extends over a larger area. In front of the bast of each vascular bundle there appears a group of sclerenchymatous cells, the formation of sclerenchymatous fibres only at isolated intervals, and it is only in the old bark that the formation of sclerenchyma fibres takes place to such an extent that they outnumber the cells of the sclerenchyma. In front of the bast where we now find the sclerenchyma groups (fig. 16), there were, originally, the oil ducts; these,

through the growth of the bark, have been removed in an outward direction and separated without increasing the number; on the contrary, in the older bark, they disappear entirely. Even the primary sclerenchyma, which originally lay between the secretory ducts (fig. 15, *sf.*), are now exterior to the sclerenchymatous zone bordering on the bast; at the same time, however, the formation of sclerenchyma has begun from the outer portion of the bark; the bark parenchyma directly under the first cork layer, being transformed into sclerenchyma, becoming a mantle of several layers of cells.

In the parenchyma, which is enclosed by these two zones or layers of sclerenchyma, we find the commencement of the formation of the crystalline envelopes which we have previously found to surround the sclerenchymatous fibres. These envelopes are formed only after the sclerenchyma fibres have attained complete maturity, and are derived from the surrounding parenchyma cells, the process of their formation being rather slow. A transverse section through the young bark shows that in no case is a young fibre surrounded by this ring of cells containing crystals, but that the fibre is enclosed entirely by parenchyma cells. In the bark of older twigs, we often find at first a few, sometimes more of these crystal-bearing cells contiguous to the periphery of the fibre (plate 2, figs. 13 and 14), from which we can already draw a conclusion as to the gradual formation of this envelope. A longitudinal section of the bark showing the corresponding stages of development, gives us a better insight into this formation. (Plate 2, fig. 12).

The growth of this crystalline envelope begins usually at different points of the exterior of the fibre in a longitudinal direction, each parenchyma cell in immediate contact with the fibre furnishing by its own fibre in a division the cells which contain the crystals. In most cases the parenchyma cells divide into two daughter-cells by the formation of a wall perpendicular to the longitudinal axis of the fibre. In this mode of division, both of the daughter-cells become chambers containing crystals. As figure 14 x shows, the division can also occur by the wall formation taking place parallel to the longitudinal axis of the fibre. In such a case only one of the daughter-cells formed is in immediate contact with the fibre, and only this one becomes a crystal-bearing cell. This mode of division most naturally occurs when the original parenchyma cells may present their ends and not their sides to the fibre. It occasionally happens that a longer parenchyma cell may form successively more than two or three crystal-chambers. From fig. 12, we can see that the cells of the fundamental tissue next to the fibre are not drawn into service successively for the formation of these chambers, the series of these crystal-bearing cells being often interrupted by unchanged parenchyma cells, which at a later period annex themselves to the others.

In this manner, the formation of the sheath proceeds to its completion; at what period of the growth of the bark this stage is reached, I am unable to say, as I was not in possession of specimens intermediate between one to three year old shoots and very old bark. It is very probable that the division of the cell occurs before the formation of the crystal; for we often find walls in the cells which are becoming part of this sheath, and yet contain no crystals, (plate 2, fig. 14 x). A circumstance which militates against the view that the crystals appear before the division of the cell, is found in the fact that the crystals never occur in parenchyma cells possessing their original forms and dimensions; that the crystals themselves always fill the divided cells, and are of similar form and size, is also an evidence of their secondary formation.

It is naturally difficult to determine whether this large quantity of oxalate of lime has been separated by the fibre itself during its development, and only deposited in the surrounding cells. We may, however, suspect the existence of some such definite relation in their occurrence, inasmuch as we already know of analogous cases where deposition of oxalate of lime crystals takes place in the walls of the fibre itself, as in the spicular cells of *Welwitschia mirabilis*, leaving no room for doubt that they are separated by the fibre itself. Another query suggests itself to us in considering this structure, whether the deposition of oxalate of lime is not connected with the process of sclerosis; at any rate, it is worthy of remark that not only surrounding the sclerenchyma fibre itself, but particularly in the young bark in the immediate vicinity of the groups of short sclerenchyma, quantities of oxalate of lime are also deposited in the parenchyma cells, without, in this instance, taking the form of tubes.

Description of Quebracho Wood.—The wood of *Aspidosperma Quebracho* possesses properties similar to those of the bark,* though in a less marked degree, and has been used in its stead, although, in future, the more active bark will undoubtedly be preferred to the wood, which latter, in consequence, will not receive the same pharmacognostic consideration. It, nevertheless, is of considerable interest on account of several anatomical peculiarities.

The quebracho wood was first shown in 1873 at the Vienna Exposition, among a collection of 104 varieties of wood obtained from four provinces of the Argentine Republic, bearing only the local name, and without any further descriptive notices†. There was, likewise, a large collection of woods from the La Plata States, at the Paris Exposition of 1878; these, however, bore their scientific names and explanatory notices. Among these appeared *Lignum Quebracho Blanco*, with a correct statement of its source.‡

*Penzoldt Berliner Klin. Wochenschrift. 1880. No. 10.

†Official report on the Vienna Exposition of 1873, by authority of the Central Committee of the German Empire. Vol. II., p. 745.

‡Report on the Agricultural Section of the Paris Exposition of 1878. Dr. L. Wittmack.—The useful plants of every zone. P. 28, 39, 70, 71.

A communication respecting the wood has been given by Dr. J. Möller.* The sample in my possession, was an entire transverse section obtained from Prof. Hieronymus, of Cordoba. The diameter of the woody portion, after the separation of the bark, which latter was about 20 millimetres in thickness, was 29 centimetres, and from the number of rings it must have belonged to a tree about 80 years old, whence we may conclude that the increase in girth takes place slowly.

The wood is not of uniform color, the older wood being of a light chocolate brown, the depth of color decreasing toward the exterior, so that, passing through different shades, the younger wood appears yellowish, or of a light reddish-white. The wood is of exceptionally close texture and hardness, and possesses a high specific gravity. With a lens we can discover numerous medullary rays, and in the vascular bundles between them, vessels appearing as countless small pores.

A microscopical enlargement of the transverse section (plate 3, fig. 18), shows this regular arrangement of the three principal constituents, and gives us an insight into the structure of quebracho wood. Between each two medullary rays (m) of varying width, embracing from one to four rows of cells, we find a woody layer composed of cells with small cavities and thickened membrane. Lying in this woody layer, differing more in size than in form, we find the vessels distributed. The woody layers, which are bounded by the medullary rays, appear at first glance to possess a very uniform composition; a closer inspection, however, even with moderate enlargements, shows that between the wood cells with thickened walls and minute cavity, we find other cells with larger cavities and more delicate membrane; they are shown in the enlargement of the transverse section (fig. 18) as white dots in the woody layer; a greater enlargement of a part of this section enables us to gain a better insight into these relations. In fig. 19, we see two medullary rays, with the enclosed woody layer, in which there is also a vessel. The medullary rays, (m) show nothing abnormal in their form or structure; they consist of prismatic cells arranged horizontally and radially in their longest diameter. A tangential and longitudinal section shows that the edges of the cells are slightly rounded, so that their form approaches that of a cylinder.

The walls of the cells are dotted. The transverse section of the vessels is usually circular or somewhat oval. The wood-fibres (h. f.) are very characteristic; a transverse section shows them to be nearly circular, and a bundle of them consequently presents numerous intercellular spaces. The wall is thickened to a marked degree, in which we cannot, however, discover the existence of layers, but very distinct pore-canals are present.

The absence of any layers in their thickened membrane, causes them to refract light in a uniform manner, lending to the wood a peculiar, characteristic, shining appearance. Between the wood fibres and in the immediate neighborhood of the vessels as well as at the boundary of the medullary rays are scattered parenchyma cells. (p.) A complete knowledge of the structure of the wood and the form of its elements is obtained, however, only from a comparison of both longitudinal and transverse sections. The wood-fibres are long and spindle-shaped, of a configuration denominated by Sanio as "libriform," which, however, on the authority of De Bary we simply call wood-fibres. The vessels are jointed at short intervals and their walls are thickly covered with small bordered pits.

A more definite knowledge of the details of its anatomical structure is obtained by maceration with nitric acid and chlorate of potash, by which the elements of the wood are isolated. In figures 20-23 these are shown separately, and it is only by this separation from the mass and each other that it is possible to discover certain peculiarities of form which would otherwise remain concealed. We find that the medullary rays are not composed simply of cells of equal length, but between them we find crystal-bearing cells of smaller size, usually connected in groups of three or four. Each single cell contains a crystal of oxalate of lime and also a mucilaginous substance of homogeneous structure. (Plate 3, fig. 22). It seems probable that a row of such crystal-bearing cells has been produced from a single cell of the medullary ray. The entire length of such a row of cells is, as a rule, equal to that of a cell of the medullary ray, and the fact of their remaining connected after the maceration, is also in favor of the view that we have only a chambered medullary cell before us.

The wood-fibres have a considerable length, as is shown by figure 20, which represents a part of one with its spindle-shaped extremity. The formation of the pits is remarkable. The pits of wood-fibres in most cases are not bordered. Bordered pits occur, however, in *Quercus*, *Daphne*, *Liriodendron*, *Fraxinus* and according to Sanio's statement, in *Jatropha Manihot*.*

Usually, little can be discovered of the character of the pits in wood-fibres, owing to their minuteness; in the foregoing case, however, they are distinguished by their size and prominence. They are bordered pits forming a relatively wide spherical chamber connecting by a narrow channel with the cavity of the cell; these canals show the usual cleft and crooked appearance. There is nothing remarkable about the vessels inasmuch as they conform to the usual type.

The parenchyma cells constitute the last element to be considered; these, though not showing any peculiarities in their transverse section when isolated, are found to have a very peculiar form, which was discovered by Sanio† and named by him conjugated parenchyma. We find therein finger-

*Report on the Paris Exposition of 1875. Raw material from the Vegetable Kingdom. Vol. VIII.

†De Bary's Anatomy, p. 400.

‡Sanio. Botan Zeitung, 1873, p. 94.

shaped protuberances of the membrane, perpendicular to their greatest diameter, usually occurring only on one side, and varying greatly in number, size and form, as shown by plate 3, (fig. 23, a-f). The membrane shows the presence of dots which have the appearance of delicately defined circles, which are, however, not distributed regularly on the walls, sometimes being grouped together in one place, while they are absent from the remaining portion of the wall; again, we find, that they are almost entirely absent.

Sanio's observation with reference to these finger-shaped protuberances needs a correction in one respect, namely, in regard to the membrane being really continuous, although they appeared to him perforated. In the cells of quebracho wood the continuity of this membrane is very apparent, as is also the fact of each protuberance being provided with numerous dots; this can be made plainer to the view by coloring sections of the cell membrane as in fig. 23, a-e. A very plain and satisfactory view can be obtained by observing these protuberances from above, as shown by fig. 23, f, which discovers to us the existence of the variable number of these small pits giving the appearance of a sieve to the end of the protuberance; when the protuberances end more pointedly there is usually but a single large pit present (fig. 23, e). The peculiarity of this cell-form has already been observed by J. Möller, although he failed to notice the existence of pits, in consequence of which in his communication on quebracho wood,† he has given us an erroneous illustration of the cells, which appear as if the protuberances possessed a large opening at their ends, which, in itself is highly improbable.

We see from the transverse sections (figs. 18 and 19) further confirmed by delicate longitudinal sections through the wood, that these cells lie isolated between the wood-fibres and surround the vessels in larger numbers; by means of these protuberances, they are connected partly with the vessels and partly with each other. In the lighter-colored, younger wood, they contain numerous large starch grains; in the heart-wood, however, instead of starch, they are filled with a brown substance, as is the case with the medullary rays; the brown color of the heart-wood is owing to the presence of this substance, is soluble with difficulty in alcohol, more easily in ether and turpentine, if we allow a thin section to stand one or more days in contact with the solvent. In contradistinction to other woods which pass under the name of "Quebracho," we find that the vessels and wood-fibres are invariably empty. At both the Universal Expositions the wood of Quebracho Blanco was designated as a tanning material; it is, therefore, somewhat remarkable that we can discover no astringent substance on micro-chemical investigation; neither salts of iron or chromic acid produce the usual characteristic reaction, even when the wood is macerated for a considerable time in contact with the reagents.

Even the bark contains but little astringent matter; from the report of Paschkins* it contains only 3.48 per cent. It must be remembered, however, that tanning materials are of considerable importance for the Argentine Republic, and even poor material finds ready application for the reason that large numbers of cattle are annually killed, chiefly for the value of their skins, the preparation of extract of meat having but lately made their flesh of any value. Tanning is, therefore, a very important branch of industry, even though pursued under a great many difficulties caused by the climate, which induces rapid decomposition. The material which is principally used for tanning seems to be, however, the wood and bark of Quebracho Colorado, containing, according to Jean,† fifteen per cent. and according to later authorities even from twenty-one to twenty-three per cent. of astringent matter. This wood has found its way to Europe and also occurs in commerce, here, as a tanning material, either in a chipped condition or else use is made of the extract manufactured therefrom. The similarity of names makes it easy to be mistaken for the wood *Aspidosperma Quebracho Blanco*. I append therefore a few of the characteristics of the wood of Quebracho Colorado, and also of another wood occurring in commerce under the name of Quebracho. The wood of Quebracho Colorado (*Loxopterygium Grisebach*) is extremely hard and dense. I have in my possession a portion of a twig, with bark attached, of five centimetres in diameter, for which I am indebted to Dr. Vulpus, of Heidelberg. The bark is much torn and fissured from the large development of the corky layer, externally of a dirty yellow to a dark-brown color and covered with numerous remains of lichens. The surface of a transverse section of the bark is light-brown, discovering many dark parallel corky layers, and at right angle to these, numerous lighter colored lines which are the medullary rays. It is very difficult to mistake this bark for that obtained from Quebracho Blanco. Microscopically, the bark is characterized by the very regular arrangement of its sclerenchyma. The parenchyma of the bark is traversed in a radial direction by numerous medullary rays, between which are arranged with great regularity, rather lengthy, tangentially extended groups of sclerenchyma fibres, which consequently form concentric zones, interrupted by the medullary rays, thus giving to the bark a mapped appearance. These sclerenchyma fibres are also surrounded by a sheath of crystal-bearing cells, possessing a very similar appearance to those in the bark of *Aspidosperma Quebracho*. They are, however, much smaller in diameter and do not lie alone, but exist in groups of a nearly rectangular form. We find, in addition, in the bark-parenchyma a yellowish colored

‡Dr. J. Möller, Anatomical Notes, *Jarb. f. wiss. Botanik.* Vol. 12, part 1, plate 11, fig. 2.

*Report of the Paris Exposition, vol. viii, p. 26.

†Bulletin de la soc. Chinique, 1878, vol. xxviii, p. 6. Max Siewert, Tanning materials of South America. *Pharmaceutical Journal and Transactions.* Third series, vol. viii, p. 546, 1877-78.

mass of homogeneous appearance, seemingly composed of greatly thickened cell-membranes; they are, however, the compressed membranes of collapsed cells, very probably sieve tubes. The coloration of the wood varies with its age, the heart-wood being dark-brown and the younger wood of a light brown color. It is composed of wood-fibres, wood parenchyma, vessels and medullary rays.

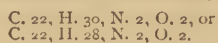
The cells of the wood parenchyma with their dotted walls form a much more considerable portion of the wood than is the case in *Aspidosperma Quebracho*. They are distributed principally around the vessels and contain a large proportion of starch. In the wood-fibre the characteristic pits of *Aspidosperma* are absent, but they are characterized by another peculiarity; the primary membrane is thickened somewhat, the secondary deposit by which the cavity is narrowed has its boundary sharply defined from the remaining membrane, a fact plainly discoverable after treatment with iodine solution. This structural peculiarity distinguishes at once the wood of *Quebracho Colorado* from that of *Quebracho Blanco*. The vessels are oval or circular, of different sizes, frequently occurring in groups of two or three, and show only in exceptional cases the formation of hernoid protrusions. They are filled with a mass varying in color from yellow to brown, soluble in water and alcohol and giving a precipitate of a blackish-green color with salts of iron.

Another sample of the wood designated as "*Quebracho wood*," and obtained from Herr W. A. Büdingen, of Frankfort, differs from both of the above. The origin of this wood could not be satisfactorily determined; it possessed a uniform reddish-yellow color; it is also very hard and dense, but does not possess the coherence of the other two, being of an irregular splintery structure and more easily split. In a chipped condition, it may be confounded with the wood of *Aspidosperma Quebracho*, a transverse section showing even some similarity to the latter. A thorough examination, however, permits of positive distinction. The wood-fibres do not possess a circular form, but are somewhat angular and consequently lie closer together. The bordered pits of *Aspidosperma* are absent here, as are also the parenchyma cells so characteristic of the former. The vessels are thickly filled with hernoid protrusions which contain a substance of a brown color; this substance is also found in the wood-fibres and medullary rays. It is easily soluble in alcohol with difficulty in water, giving in both solvents a blackish-green coloration with iron salts, and is consequently an astringent substance. It is not soluble in ether or turpentine. This substance is frequently found secreted in such quantity, that it exists in large lumps in the space between the elements of the wood, and appears also at other points in the shape of blood-red transparent layers.

EXAMINATION OF THE PITH.—In making a close examination of a transverse section of a two to three year old tree of *Aspidosperma Quebracho*, the observer's attention is especially drawn to the pith which appears in the shape of a regular triangle. This configuration is caused by the peculiar form and arrangement of a portion of the pith mass. Usually the pith of woody dicotyledons is composed principally of parenchyma cells, which increase in number while decreasing in size in proximity to the wood, but still, even near the medullary sheath, are not remarkably different from the cells composing the principal mass of the pith. *Aspidosperma Quebracho*, however, shows peculiar relations of the above region, inasmuch as it is composed of two different elements. The central portion consists of spherical cells, between which are found isolated sclerenchyma fibres. Towards the exterior, both the form and size of these cells change to a narrow-meshed tissue leading to the woody ring. This tissue is already present in a shoot of a year's growth (plate 2, fig. 15, m. s). The cells thereof are small, or irregularly triangular, or quadrangular form, possessing a great similarity to those of the bast. In a very young twig the form of a transverse section of the pith is oval, assuming, however, in older twigs, the form of a regular triangle (plate 3, fig. 25). With the increase in girth of the trunk from secondary growth, the bark not keeping pace with the growth of the wood and bast, a considerable pressure is exerted* on the bast portion. This pressure extends even to the pith and causes the alteration of its form. In the specimen under consideration, the following conditions and results may be observed: The wood, owing to the solidity of its cells, is capable of resisting the pressure without alteration of its form. When this pressure extends in an inward direction the central, spherical cells of the pith, exert a certain opposing pressure, as long as they are turgid. The portion least capable of sustaining the pressure is the tissue composing the outer medullary layer, and consisting of flat cambiform cells, which consequently must yield to the simultaneous internal and external pressure. The result is that a portion of this cellular tissue on being subjected to pressure as above described, does yield, and especially the innermost part which is adjacent to the spherical pit cells. The pressure is exerted even to the degree of obliterating the cavity of the cells. These masses of cell-walls lying close together present the appearance of a homogeneous mass which, in the form of three semilunar plates, encloses the pith. The appearance of this triangular section leads us to the conclusion that the pressure on the pith cylinder is not exerted equally; were such the case, the pith should have a circular form. The fact of its taking the shape of a triangle is an evidence that the external pressure is strongest on three sides. The cause of this unequal pressure appears to be immediately dependent on the verticillate arrangement of the leaves. At all events the pressure must be considerably less at the point of insertion of the leaves, than at other parts of the circumference, an opposing force being exerted by the growth of the leaves.

*H. de Vries. *Flora*, 1872, No. 16.

Chemical Composition.—Report of George Fraude in article translated from Prager Medicinische Wochenschrift, (Therapeutic Gazette, January, 1880, p. 13):—Out of the bark, which Dingler has examined pharmacognostically, George Fraude has prepared an alkaloid in small, white, prismatic crystals, which he called aspidospermine. The same is easily soluble in alcohol and ether, very slightly soluble in water and melts at 205° to 206° . The muriatic and sulphuric salts are very easily soluble in water. The taste is intensely bitter. Fraude gives to the alkaloid the following formula:



It appears to approach the Cinchona group. The extract made as above mentioned out of Quebracho wood is fluid, dark brown, and of a bitter astringent but not disagreeable taste.

Report in Ber. d. Deutsch. Chem. Gaz.—New Remedies, (Therapeutic Gazette, August, 1880, p. 246).—FRAUDE.—Aspidosperma quebracho Lor. is an apocynaceous tree quite common in the Province of Santiago, in Chili (also in Brazil). Its bark has a brownish-yellow color, inclining to reddish. (The wood is very hard, and contains from 15.7 to 18 per cent. of tannin, differing from that of oak-bark and chestnut-wood, besides 2.3 per cent. of an astringent acid, resembling gallic. According to Arnaudon, it also contains a yellow dye-stuff. See Dingler's Pol. J., vol. 221, p. 451.—ED. N. R.)

The bark has long been used in its native country as a remedy in intermittent fever, and is said to approach cinchona bark in efficacy. The author found in it an alkaloid which he termed aspidospermine, easily soluble in alcohol and ether, little soluble in water. The solutions of the sulphate and hydrochlorate are very bitter, resembling quinine. Analysis proved it to have the composition either of $\text{C}_{22}\text{H}_{28}\text{N}_2\text{O}_2$ or $\text{C}_{22}\text{H}_{30}\text{N}_2\text{O}_2$, further examinations being necessary to decide between these two formulæ.

Report of the analysis of Fraude from The Druggist, (Therapeutic Gazette, June, 1881, p. 235,) gave reason to believe that the activity of quebracho bark, aspidosperma quebracho, depended upon an alkaloid which he named aspidospermine. From the fact that this alkaloid does not possess the anti-asthmatic property of the drug, Hesse set to work to examine the bark more closely, and has found in it, besides 0.17 per cent. aspidospermine, as much as 0.28 per cent. of a new alkaloid, which he terms quebrachine.

Quebrachine is but slightly soluble in cold alcohol, but hot alcohol dissolves it more readily, and it crystallizes from a solution in small white anhydrous prisms. It is with difficulty soluble in ether. Quebrachine melts at 214° to 216° C. under partial decomposition. Its chemical composition may be represented by the formula $\text{C}_{21}\text{H}_{22}\text{N}_2\text{O}_3$.

Quebrachine dissolves in pure concentrated sulphuric acid with a bluish tinge, which becomes darker upon standing. When lead peroxide or molybdic acid is present, the coloration is quite instantaneous and is very intense. A crystal of potassium bichromate dropped into a solution of quebrachine in sulphuric acid produces the same effect.

Boiled with a solution of perchloric acid, quebrachine yields, like strychnine, curarine, a yellow decoction, but, although very poisonous, 0.04 g. being sufficient to kill a small rabbit, Penzoldt finds that its physiological action is not identical with strychnine.

Quebrachine is a strong vegetable base. Its alcoholic solution turns red litmus paper blue, and it completely neutralizes even strong acids.

The author has formed several salts of the base, some of which differ from the corresponding salts, aspidospermine, in being less easily soluble in water.

Adulterations and Substitutions.—Dr. Hansen also reports in his essay false varieties of bark, and as Quebracho bark has proved of great merit, as instanced by numerous tests both in hospital and private practice, it is of utmost importance that only the genuine bark be employed in the manufacture of pharmaceutical preparations purporting to contain this drug. Gold itself is liable to imitation, and just to the extent that a drug approaches that metal in value, weight for weight, is it liable to similar sophistication.

FALSE QUEBRACHO BARKS.

Report from Dr. Adolph Hansen, assistant at the Botanic Institute of Erlangen, from essay by him, (Therapeutic Gazette, October, 1880, p. 294).—In closing the examination of Quebracho bark, it may be well to devote a few words to the false varieties of bark. So far there have appeared in commerce only two false barks, which differ, however, from the genuine Quebracho so decidedly, that it is hardly possible that they will in future be mistaken therefor. One of these barks, a sample of which was obtained from Brueckner and Lampe, Leipzig, and of which considerable quantities were sold, proved to be the Cortex Copalchi, long known though little used as a drug. The plant from which it is obtained is the Croton Pseudochina Schlechtendal, one of the Euphorbiaceæ; its home is Mexico and it has been used as a febrifuge, not only in its native country, but in other parts of America; the shipment from which the sample was obtained came from Brazil. Cortex Copalchi occurs in commerce in rather long quilled pieces; externally the bark is covered with a dirty white corky layer, more or less fissured, which can be rubbed off in powder. The thickness of the pieces is usually from one to five millimetres according to the age of the twigs from which they are obtained. A transverse section of Copalchi bark, examined either with or without a lens, shows a yellowish-white exterior and a dark-brown fibrous layer, which has been formed from the bast of the trunk. The bast fibres are small, converging to a point at

their outer end, somewhat bent, and the bark presents in consequence the appearance of flame-like rays of dark-brown color. For the identification of Copalchi bark and its distinction from Quebracho, this superficial examination is sufficient, rendering a microscopic examination unnecessary; it has in addition an aromatic smell and taste, while Quebracho bark does not possess these properties. A second false variety was obtained from Messrs. Grundherr & Hertel, of Nürnberg; it was a hard bark of uniform dark-brown color, covered with a whitish to grayish-brown corky layer and much furrowed on the interior surface. While I have not yet succeeded in determining the origin of the last variety it is sufficient to state that it bears no resemblance to the Quebracho bark.

Report from Dr. J. Biel, of St. Petersburg, in *Pharm. Zeit.*, *British Medical Journal*, (*Therapeutic Gazette*, June, 1880, p. 182.)—Dr. J. Biel, of St. Petersburg, in the *Pharm. Zeitung*, calls attention to a false white Quebracho bark which came to Hamburg. The first lot of white Quebracho bark received in Hamburg was a very small quantity, and the second lot consisted of three serons. Dr. Biel, therefore, supposes that what is being used in Germany at present is not the true drug, and therefore sounds this warning note; but a drug which promises well should not be unjustly condemned before it has had a fair trial.

Pharmaceutical Preparations.—Report of Dr. Burgos, in a paper published in the *Revista Farmaceutica* and abstracted in *Pharm. Journal*, Dec. 20th, 1879, *New Remedies*, (*Therapeutic Gazette*, August, 1880, p. 238.)—Dr. Burgos recommends several preparations of quebracho, which may, of course, be administered in substance. The infusion or the decoction, usually of the strength of one in twenty, is improved by making it with the aid of a little sulphuric or acetic acid, whereby more of the alkaloid is extracted, and the resulting preparation is rendered much clearer. Tincture of quebracho is prepared by macerating one part of the bark in 5 parts of 56 per cent. alcohol for 8 days, and filtering.

Compound Tincture of Quebracho: Quebracho bark, 2 parts; orange peel, 1 part; alcohol (56 per cent.), 5 parts.

Wine of Quebracho: Quebracho bark, 1 part; alcohol (56 per cent.), 2 parts; white wine, 16 parts. Leave the alcohol in contact with the bark for 24 hours, then add the wine, macerate for 8 days and filter. The author specially recommends San Juan or Mendoza wine, because either of them contains but little tannin, and possesses a special aroma which communicates an agreeable flavor to the preparation.

Elixir of quebracho: Wine of quebracho mixed with a sufficient amount of sugar.

Extract of quebracho: Both an aqueous and an alcoholic extract may be prepared.

Syrup of quebracho: Quebracho bark, 3 parts; water, 32 parts; sugar, 16 parts. Boil the bark with the water, filter, and evaporate down to one-fourth; then add the sugar and make the syrup in the usual manner.

Preparations with the alkaloid. *Aspidospermine* or *quebrachine* is insoluble in glycerine. It dissolves readily in fats and fixed oils, and may be incorporated with cod-liver oil in larger proportion than quinine. The following is a suitable formula:

<i>Aspidospermine</i>	6 to 8 parts.
Cod liver oil.....	100 "

—*New Remedies.*

Report from New York Therapeutical Society, (*Ther. Gaz.*, Dec., 1881, p. 473.)—The committee is greatly indebted to its distinguished member, Dr. Squibb, for his liberality and zeal in placing at its disposal a preparation of quebracho which could be relied upon with perfect confidence. Although the drug is not upon the list of those manufactured in his laboratory, he had a fluid extract prepared under his personal supervision, expressly for the committee, from specimens of the bark selected by himself. This extract was used in the greater number of the cases forming the basis of this report. In the remainder a fluid extract prepared by Parke, Davis & Co., of Detroit, was used, which evidently represents the active principle of the drug. The extract is very bitter and somewhat astringent, and the taste lingers a long time in the mouth. In persons with sensitive stomachs it is apt to excite nausea. The dose usually employed is half a drachm, which may be repeated several times a day.

Physiological Action.—Report from Schikendanz, *Sitzungsberichter physico-medical society*, Erlangen, 1879, 17 Febr., and *Bul. kl. Wochenschrift* 1879, No. 19, in article translated from *Prager Medicinische Wochenschrift*, Dec. 17, 1879, (*Therapeutic Gazette*, January, 1880, p. 13.) Penzoldt, whose communications have for the first time called our attention to this subject, generally used the following formula for his experiments: 10.0 of the powdered bark, macerated eight days with 100.0 alcohol, filtered, evaporated, dissolved in water, again evaporated to dryness and dissolved in 20.0 water. Experiments upon frogs with 0.5 of the bark gave complete motor-paralysis of central origin, with paralysis of the respiratory organs and diminished frequency of the heartbeat (from 54 to 60 pulsations successively down to 8 to 10). This latter action was not caused "by irritation of the vagus." With rabbits 1.0 of the bark used hypodermically was followed by paresis of the extremities and difficulty of breathing; 2.5 caused death, preceded by paralysis of the voluntary movements, great dyspnoea and terminal convulsions (of dyspnoea origin?). Breathing was deepened and retarded. Changes in the frequency of the heartbeat occurred only upon intravenous injection, the blood pressure reaching the former height after a temporary sinking of the same.

In a healthy dog dyspnoea was caused with increase in frequency of the heartbeat and salivation. The temperature of the body was not perceptibly influenced by 5.0 of the bark. In dogs in which fever was induced by miasmatic infection, the action was similar. Also in man, healthy as well as feverish, (from phthisis, intermittents with phthisis, pleuritis), 3 to 8 c.c. of the solution mentioned above had no influence upon the temperature, and caused only immaterial diminution in the frequency of the pulse. Penzoldt found, however, in different forms of dyspnoea (from emphysema and severe bronchitis, phthisis, chronic pneumonic processes, with periodic asthma, and pleuritis) that after giving 1 to 2 teaspoonful doses of the above solution (sometimes 2 or 3 times a day), the frequency of breathing generally diminished, the respirations were less deep, and that especially the cyanosis (in phthisis and emphysema) was almost invariably diminished or removed. These effects lasted for hours and were followed, without exception, by greater or smaller, sometimes extraordinarily subjective, improvement of the patient. In one case of inherited pulmonary stenosis, and in another of thrombosis of the left main branch of the art. pulmonalis, the effect was very remarkable, though but temporary. Urged on by these observations, I have used an extract of the Quebracho wood (*this is less effective than the bark, which it is more difficult to procure*) since the publication of Penzoldt's article, and have used it in six cases of emphysema and chronic bronchial catarrh.

THERAPEUTIC PROPERTIES.

Reports from Private Practice.

1.

Report from A. Berthold in Prager Medicinische Wochenschrift, January 20, 1881; (Therapeutic Gazette, January, 1880, p. 92.) A. Berthold reports a case where the remedy had been used after a sudden attack of asthma. The patient, a man 65 year of age, was given the tincture in teaspoonful doses repeated every hour, and at the end of the first hour the breathing was reduced in frequency from 64 to 60 respirations, in the third hour to 30, and decided decrease of the symptoms, with complete recovery the next day. The remedy has been administered in 14 other cases, in which, with few exceptions, it acted as a palliative. In one instance, where the patient had for years suffered from emphysema of the lungs, great improvement was noticed; likewise in a case of dyspnoea in a woman of 60, and in two cases of fatty degeneration of the heart, patients aged, respectively, 72 and 68.

In the case of a 72 year old lady who was affected with pleuritic exudation, and also in a case of chronic catarrh of the lungs, no benefit was received. In six cases of phthisis, only two were noticeably relieved after administration of the remedy. No derangement of normal conditions was observed to be due to the remedy. The author also speaks very highly of the spirituous extract of quebracho as a remedy for diarrhoea.

2.

Report from L. Laquer, in Prager Medicinische Wochenschrift, January 20, 1881; (Therapeutic Gazette, January, 1880, p. 93.) L. Laquer used the medicine in the following manner:

℞ Ext. corticis quebracho, 12.0.
Mucil. g. g. arabic, 40.0.
Aq. dest., 200.0.

Dose, one to two teaspoonfuls daily.

In 22 cases of dyspnoea, varying in severity, his experience led him to the following conclusions:

1. In many cases of dyspnoea, emphysema pulmonalis, and chronic bronchitis, quebracho is a very useful palliative, while in others, especially in aged patients, it was of no service. In dyspnoea dependent on valvular insufficiency, its value is questionable.

2. The continued use of quebracho produces unpleasant secondary symptoms, which make its ad-

ministration somewhat difficult; these symptoms consist of headache, partial unconsciousness, dizziness, and copious salivation, and in some cases the patient evinced a positive dislike for the remedy.

3. The remedy decreases the frequency of respiration more decidedly in the extremest variations from a normal condition, while its action in decreasing the pulse is not so constant.

3.

Report of J. Krauth, in Wiener Medic. Blattern, in Prager Medicinische Wochenschrift, January 20, 1881; (Therapeutic Gazette, January, 1880, p. 93.) The cases treated with this remedy were, two of hypertrophy of the heart in the last stages, with dropsical exudation into the cavities, general oedema violent dyspnoea and extreme weakness; three cases of Bright's disease succeeding scarlet fever; one case of tuberculosis with oedematous dyspnoea, and one case of pleuritic pain with serious exudation of the pleura and violent dyspnoea. In all these cases 5 grammes extract quebracho aquosum, and 20 grammes water were given; dose, a tablespoonful every three hours, and the promptness of its action in controlling the respiration was indeed so uniform and elegant that I am constrained to recommend its further use. Although tuberculosis and weakness of the heart cannot be cured by its use, still the relief afforded the patient is a gratification to the practitioner.

4.

Report of J. B. Burkart, M. D., (British Medical Journal, Therapeutic Gazette, July, 1880, p. 188.) In a recent number of the British Medical Journal Dr. Burkart speaks in high terms of quebracho as a remedy for dyspnoea. He tried it in cases in which the dyspnoea was associated with emphysema of the lungs, atheroma of the arteries and degeneration of the cardiac muscles, and in every case the quebracho afforded immediate relief. In three minutes after the administration of the drug, the pulse became somewhat fuller, but not increased in frequency; the patients felt their breathing easier; the face was flushed, and a gentle perspiration appeared on the forehead; slight drowsiness and inclination to sleep were noticed. These symptoms soon subsided, but the breathing continued to be much improved.

5.

Report from Medical Times and Gazette; (Therapeutic Gazette, August, 1880, p. 236.) Further observations on quebracho bark.—Dr. Penzoldt's discovery (Medical Times and Gazette, vol. ii, 1879, page 35) that various forms of dyspnoea can be alleviated by quebracho bark, receives confirmation from two recent writers in the Berliner Klin. Wochenschrift, No. 52, 1879—Dr. Berthold, of Dresden, and Dr. Picot, of Carlsruhe. By both, Penzoldt's extract (referred to in our former notice) was rigidly adhered to. Dr. Berthold relates two cases of spasmodic asthma which were much benefited by the new drug. In the first the respirations fell after three doses from 64 to 30, with general improvement of the symptoms; in the second, where the asthma depended on emphysema, the effect was less rapidly produced; but the patient, who had been under Dr. Berthold's care for four years, and who generally had to lay up for one or two weeks at the time of his attacks, was about again in five days. In a case of mitral incompetence and stenosis, quebracho relieved the severe nocturnal dyspnoea most decidedly; in two advanced cases of fatty degeneration of the heart it also did good, but digitalis had to be given for the relief of oedema, over which the quebracho exerted no influence whatever. Dr. Berthold, however, from his small experience is inclined to regard the latter drug as indicated in cardiac disease when the pulse becomes irregular under the action of digitalis, and when orthopnoea continues after the digitalis has been omitted. In one or two cases of chronic bronchitis, and in several cases of phthisis in the latter stages, the drug proved unsatisfactory; in two patients with phthisis, however, it relieves the dyspnoea wonderfully. In one of these the respirations fell from 52 to 28 after teaspoonful doses of the extract every two hours. Dr. Picot not only gave quebracho with good results to three patients with catarrhal pneumonia, bronchial asthma, and cardiac disease, dyspnoea being in each an urgent symptom, but he experimented on himself with it as to its effect in diminishing shortness of breath in climbing hills. On three following days, the temperature and height of barometer remaining nearly unaltered, he ascended the same height in the same period of time. On the first day, without quebracho, his respirations rose from 16 to 42, his pulse from 64 to 94. On the second day, half an hour before starting, he took fifteen grammes of Penzoldt's extract, and reached his destination with respirations at 30 and a pulse at 80, feeling also in every way easier, as was further proved by his being able to smoke during the ascent, which he could not at all manage the day before. On the third day, without quebracho, his symptoms corresponded to those of the first day. He has also seen good results in two persons without evident organic disease, but liable to breathlessness in walking fast. We must not omit to mention that, according to the Wiener Med. Blätter (No. 41, 1879). Professor Skoda, of Vienna, has not only found benefit himself from quebracho, but has prescribed it for others with success. It is possible that as an astringent in diarrhoea the resinous residue of the bark, which is only soluble in alcohol, may be of service. Dr. Berthold noticing that the diarrhoea of a phthisical patient stopped while taking quebracho, has tried the resin in acute and chronic intestinal catarrh with good results. To children he gives 0.1 gramme in a pill of which they take ten daily. English children, however, might object to the number prescribed.

6.

Report from North Carolina Medical Journal; (Therapeutic Gazette, April, 1881, p. 160.) As unlikely as it seemed at first that the new drug quebracho (aspidosperma quebracho) could have any

influence upon cases of dyspnoea, it seems now to be well established as true. "The dyspnoea of emphysema seems, from all accounts, to be most relieved by this drug; in that of phthisis, the effect is uncertain, as well as in oedematous conditions of the lungs associated with renal diseases, but some cases of cardiac dyspnoea, and even spasmodic asthma, have been benefited by it.

7.

Report from Frank A. Ramsey, M. D., Knoxville, Tenn.; (Therapeutic Gazette, September, 1881, p. 333.) Under the same roof with me is a lady who is a patient of as good a physician as the city affords. She has a chronic eruptive disease at times, involving her throat and possibly her lungs. No tubercles. She is affectionate in disposition, but impulsive and at times violently manifests displeasure. In such paroxysms she always has dyspnoea, formerly to the extent of occasioning blueness of the lips. Now she calls on my daughter for a dose of fluid extract of quebracho. Before she knew of this agent she suffered almost constantly. Now she says half a teaspoonful will give relief very soon and enable her to meet and entertain company and contend with the boys—her children—throughout the day.

It is the only opportunity I've had to employ this agent. In this one person the effect is remarkable and positive.

8.

Report from Pharm. Zeit., New Remedies; (Therapeutic Gazette, August, 1880, p. 238.)

1. Quebracho bark appears in many cases to be a useful palliative for dyspnoea in pulmonary emphysema and chronic bronchitis; in other cases, however, the remedy is without any effect, especially in aged individuals. Its value as a remedy in dyspnoea dependent upon defective cardiac valves is at least doubtful.

2. If used for any length of time, the drug produces disagreeable effects which make its continuance difficult.

3. The frequency of respirations is diminished by the drug the more decidedly, the greater their excess has been over the normal condition.

9.

Report from Dr. F. Rohne, of Zurich, Switzerland. Translated by Dr. H. P. Wenzel. Va. Medical Monthly, March, 1881, (Therapeutic Gazette, June, 1881, p. 225.) The most brilliant results were obtained in the asthmatic attacks of consumption. After the use of two teaspoonfuls of quebracho solution, the respiration sank, in one and three quarter hours, from 54 to 27, or 30. During the following night the patient slept well, which, previously was impossible. In exudative pleuritis, reduction was more marked, falling from 26 to 23, to 24 to 22. In asthma of emphysematous patients (3), it fell from 32 to 36 to 22 to 18. The respirations did not change much in complications of emphysema with pleurisy—26 to 30 to 24 to 20 respirations. In a severe case of complicated bronchitis, the change was marked, from 26 to 30 to 23 to 20 respirations; once from 24 to 16 respirations. In the latter case a superficial respiration was observed at times. In a similar case, without respiratory change (18 to 19 per minute), after exhibiting the remedy, it required close observation to count the respirations; and the sharp (at times distinctly heard at a distance), whistling sound becomes markedly weaker. Marked cyanosis in phthisis, emphysema, etc., was either lessened or entirely relieved by quebracho. It also apparently had some influence in a case of "colossal" cyanosis, resulting from a congenital pulmonary and chronic pneumonia. The "acne nose" of an emphysematous patient, which usually had a vio-

let-blue color, changed to a fiery-red under quebracho, and was much admired by a room-mate. Subjectively patients, without exception, breathe more or less easy, and in some cases an extraordinarily easy respiration follows. In a case of thrombosis of the pulmonary artery, a respiratory reduction from 36 to 28 respirations per minute from 54 to 34 respirations, and from 46 to 39 respirations followed after exhibition of each teaspoonful, respectively, of quebracho solution with diminished cyanosis and greater comfort. There was no prejudicial concomittant appearance, nor narcotic action whatever. There was usually first a feeling of warmth in the head. The disposition to cough is lessened and the expectoration is expedited. Sometimes there is some perspiration—frequently slight salivation. The medicine does not taste unpleasantly, is astringent and aromatic. Penzoldt groups the foregoing results as follows: "We possess in quebracho bark a remedy which, without prejudicial consequences, alleviates asthma or difficult breathing in various diseases of the lungs and of the circulatory system. Its therapeutical action is manifested in increased frequency and depth of respiration in cyanosis, and primarily in subjective oppression. In explanation of the action of quebracho, Dr. Penzoldt remarks that after observations in experiments on animals and man. Upon using the drug redder coloration of the blood followed (arterialization). To prove this the author took too samples of blood from an animal to be slaughtered, and added quebracho solution to one, and an equal quantity of distilled water to the other sample, and he found the first after some standing decidedly more crimson. In deficiency of oxygen (under mercurial vacuum) the red coloration was moderately produced. Upon this Penzoldt grounds the hypothesis that possibly, by acting directly on the blood it supplies the power to absorb larger quantities of oxygen than usual, and that the blood flowing through the capillaries into the veins is deeper colored than normal. However, the fact

that excessive doses cause dyspnoea in animals is not explained. On the frog *aspidospermin* acts similar to the extract of the bark.

10.

Report from Dr. Berthold of Dresden, in No. 52 Berlin Klin. Wochenschrift, December, 1876, paper of Dr. F. Rohne, Zurich, translated by Dr. H. P. Wenzel, Va. Med. Month., (Therapeutic Gazette, June, 1881, p. 226.) Dr. Berthold experimented with preparations from the firm Gehe & Cie. It should be remarked here that according to reports from this firm, there was no quebracho blanco bark in stock from April 1880(?) (this statement should be, doubtless, 1870), till then, hence it appears that only *lignum quebracho* was the wood of quebracho Colorado, of *loxopterigium lorentzii* (Griesbach), Berthold using only his preparation in the different forms of dyspnoea lays the chief value of the observations on the changes in respiration. In a case of convulsive asthma the respirations sank within three hours from 64 to 30 after exhibiting three teaspoonfuls of the tincture of the wood of quebracho (Colorado). The dyspnoea was caused by pulmonary emphysema, insufficiency, and stenosis of the mitral valves, fatty cardiac degeneration, dilatation of the right ventricle. The author states that in cases of irregular pulsations when digitalis has been used, and this remedy must be discontinued, and orthopnoea persists quebracho is a desirable remedy, and the intensity of the attacks becomes decidedly weaker than before. Out of six cases of phthisis, only two were successfully treated for difficult breathing with quebracho (wood). In one of these cases the respiratory frequency fell from 62 to 28 after the second hourly teaspoonful of tincture of quebracho. There were no results obtained in the dyspnoea of croup. In diarrhoea, the best results were obtained with the extract of quebracho.

Reports from Hospital Practice.

1.

The following cases from one to seven inclusive are from report in Prager Medicinisch Wochenschrift, December 17, 1879, (Therapeutic Gazette, January, 1880, p. 13).

Prot. No. 2.801.—Johann Handl, messenger, 48 years old, emphysema, bronchitis, atheroma anterior, dein exsud. pleurit. sin. Received July 6, 1879. Had for three years (as a sequel to small-pox), cough, dyspnoea, yellowish to bloody sputa. Considerable distention of the air vesicles, epigastric pulsation, torpid liver. Diffused rhonchi and whistling respiratory sounds. Treated at first with inhalations, and sometimes with opiates. Owing to exceeding shortness of breath, he was given daily from Oct. 30th to Nov. 3rd, two teaspoonfuls, 8 c. c. of the above mentioned extract of quebracho. During this time the dyspnoea was considerably decreased, as was also the cyanosis. Improvement continuing, quebracho was discontinued. On the 12th of November, owing to the return of the asthmatic difficulties in the afternoon, one teaspoonful of quebracho was again given. In the night there was very material decrease of the trouble. Later (Nov. 17 to 20), liq. ammon. anis. and similar remedies were given without improvement, when November 20th, quebracho, with considerable relief, was once more given. December 9th dyspnoea returned, with exudation into the left pleural cavity. Half an hour after giving quebracho, there was rapid decrease of dyspnoea and cyanosis.

2.

Prot. No. 3,136.—Johann Novàh, laborer, in Nusle, 62 years of age. Received July 31st, 1879. Diagnosis: Emphys. pulm., marasm., dissolut. corp. vit. sin. Cough for 12 months, free expectoration, asthmatic difficulties. Severe emphysema, the respiratory murmur everywhere obscured by rales and bronchial sounds; great torpidity of liver. Up to October 15th, though using different expectorants and sometimes narcotics, there was no essential improvement. From October 15th to 25th, quebracho in doses of one teaspoonful of the extract, 4 c. c. produced at first small, but later good effects. From October 28th to November 13th, no medicine was given, after which quebracho was again resorted to on account of the return of dyspnoea.

3.

Prot. No. 4,073.—Barbara Procházka, wife of watchman, 72 years of age. Received October 6, 1879. Diagnosis: Emphys. pulm., catarrh, bronch. chr., slight scoliosis, much dyspnoea, cough, palpitation of the heart of a year's standing, weakness of stomach for the last 30 years. Great torpidity of the liver; atheromatous condition of the blood-vessels; increase of dyspnoea up to October 28th. On this day irregular rhythm (each third systole suspended). Under varied therapy there was small decrease of subjective troubles. On November 8th, on both sides of the posterior aspect of the lungs, loose rales covering the respiratory murmur eu-

tirely, severe dyspnœa; 4 c. c. extract quebracho given; shortness of breath disappeared entirely; cough light. From November 12th, tinct. cinchonæ comp. was given. Dyspnœa returned, and continued in spite of repeated doses of quebracho (4 c. c. per dose), until November 20th. It then improved under morphia. Since November 22d, treatment with Waldenburg's pneumatic apparatus.

4.

Prot. No. 4,138.—Johann Pelčik, sailor, 66 years of age. Received October 11, 1879. Diagnosis: Emph. pulmon. For the last year strong dyspnœa, and cough without expectoration. After giving 20 grammes of extract quebracho, taken during 24 hours, considerable improvement; breathing easy. Under similar treatment, improvement goes on until October 16th, when the patient is discharged.

5.

Prot. No. 4,385.—Johann Sterh, street sweeper, 79 years old. Received October 28, 1879. Diagnosis: Emphys. pulm., catarrh. pulm. chron., marasmus. For a long time previous he had had severe dyspnœa, preventing sleep, defective nutrition. On both sides the respiratory murmur is covered up by loose rales. Up to November 2d, under treatment with ipecac, and later with liq. ammon. anisi, there was decrease of expectoration, but steady and decreasing dyspnœa. November 2d, one teaspoonful of extract quebracho. On November 3rd, very marked improvement of asthma; happy expression of countenance, cyanosis relieved. On November 4th, dyspnœa returns; sibilant rales. On account of great frequency (148) and irregularity of the otherwise strong pulse, no quebracho, but ammonia preparations were given.

6.

Prot. No. 4,649.—Elizabeth Peth, fruit dealer, 72 years old. Diagnosis: Catarrh bronch. chron. Received November 20, 1879. Diffused rales in both halves of the lungs, covering the respiratory murmur completely; severe dyspnœa. From November 23rd, quebracho was given daily, with marked, steady improvement. On November 27th dyspnœa has ceased, and the improvement keeps on until December 2d, the day on which the patient was discharged. Case 7 came under observation December 14, 1879.

7.

Prot. No. 4,830.—A woman 44 years of age. Severe dyspnœa, respiration 36 and labored; cyanosis; 8 c. c. extract of quebracho. After ten minutes the breathing becomes suddenly free, and reduced to 28; cyanosis vanished; subjective relief complete. This improvement kept on for 24 hours. During the following night a temporary, but very great weakness of the extremities set in.

All cases mentioned above were out-patients, and appeared almost daily for examination. All have occupations which expose them to the inclemencies of the weather (messenger, street-sweeper, fruit-dealer, etc.), during the rough weather in the fall, for the sake of making a living. Nevertheless, the action of this drug, as reported by Penzoldt, has even in these cases been corroborated in spite of the continuance of the original cause. Though the extraneous circumstances in all the cases thus far observed have made detailed clinical examinations impossible, this much may, however, be stated:

1. That quebracho has proved an excellent, though but temporary remedy against the dyspnœa caused by emphysema, bronchial catarrh and pleuritis.

2. That it has been followed after using it several days (up to nine days), by no disturbance of digestion, or of the heart-beat, by no motor paraly-

sis or weakness, nor other deleterious effects (with exception of the last case?)

This new remedy may therefore justly be recommended for further trial, and would make a very desirable addition to the *materia medica*, even if its benefits were restricted to the more temporary relief of distressing dyspnœa. As the experiments on animals mentioned in the beginning of this article, show, care in the administration of this drug is to be recommended. As regards the explanation of the action of the drug, we may, in short, mention the theory of Penzoldt, which has been corroborated by experiments, that the remedy might by its direct influence enable the blood to take up more than the usual quantity of oxygen, so that the blood flows with a lighter red color than usual, through the capillaries into the veins.

The fact that the remedy causes dyspnœa in animals, if given in larger doses, could be explained, according to Penzoldt, by the increased capacity for the absorption of oxygen which ample doses impart to the blood, and also by the property which the drug seems to possess of increasing the intimacy of the relations between the oxygen and the hæmoglobin.

8.

Report from City of London Hospital for diseases of the chest, etc., J. B. Burkart, M. D., in *British Medical Journal*, (*Therapeutic Gazette* Aug. 1881, p. 238.) The liquid extract of quebracho has of late been largely employed in the treatment of asthma. As yet, there are no indications for its use, except the presence of dyspnœa. A teaspoonful, repeated, if necessary, at intervals of ten minutes, certainly relieves, as I have observed, the dyspnœa of phthisis, of pneumonia, of pleurisy, of emphysema, and of valvular lesions. It has failed of its effect, so far as I have seen, only in two cases of aortic disease; in the one, the patient had been for years accustomed to inhale nitrite of amyl almost every two hours; in the other, there was complication with marked attacks of stenokardia. The active principle of quebracho appears to be a gum-resin; but as to its mode of action nothing is known. I have frequently noticed that, after the administration of the drug, there is slight flush of the face, perspiration, and occasionally drowsiness; but there are no objective signs on the part of the heart and of the lungs sufficient to account for the relief.

9.

Report from Bellevue Hospital (Independent Practitioner, *Therapeutic Gazette*, Sept. 1881, p. 357.) The results of recent experience with this drug have been confirmatory of its value in dyspnœa in all its forms. The fluid extract in doses of from twenty to sixty drops, every hour or two, as called for by the symptoms, has been found useful in our hands also, without regard to the exciting cause of the dyspnœa.

10.

Report from New York Therapeutical Society, (*Therapeutic Gazette*, Dec. 1881, p. 473).

This report embraces thirty-two cases observed by members of the society and others, as follows, viz.:

Two cases by Dr. A. V. B. Lockrow.—One, emphysema and bronchitis; and one, asthma, emphysema, and bronchitis. Both relieved.

Six cases by Dr. J. A. McCreery.—One, mitral insufficiency, with no benefit; one, bronchitis, with great obesity, no relief; one, chronic bronchitis; two of asthma and bronchitis; and one, bronchitis, with consolidation at apex of one lung. The last four, dyspnœa relieved.

Four cases by Dr. R. T. Bangs.—Two of spasmodic asthma and one of aortic aneurism, dyspnœa

relieved; one of cardiac disease, in which there was some relief.

Two cases by Dr. C. W. Packard.—One, mitral stenosis, and one, cardiac hypertrophy, with dilatation, neither of which was relieved.

One case, by Dr. W. R. Birdsall, of tonsillitis, in which dyspnoea was relieved.

One case, by Dr. F. A. Burrall, of Bright's disease; dyspnoea relieved.

Eight cases by Dr. L. Emmett Holt.—One case, cancer of lung, dyspnoea relieved; four cases, asthma and bronchitis, two relieved and two unrelieved; one case, each, pneumonia following infarction, pleuro-pneumonia, and Bright's disease with oedema of lung, all of which were relieved.

Four cases by Dr. J. T. Duffield. One of fatty heart, with slight relief; one, catarrhal phthisis, second stage, dyspnoea relieved; one, catarrhal phthisis, third stage, no benefit; one, intermittent fever and old pleurisy in an opium-eater, dyspnoea increased.

Two cases by Dr. G. Bayles.—One of cardiac disease and asthma, and one hysterical dyspnoea; in both cases, dyspnoea relieved.

Two cases by Dr. A. H. Smith.—One, mitral insufficiency, no benefit; and one, asthma with pleuritic adhesions, dyspnoea relieved.

11.

Report from New York Therapeutical Society, (Therapeutic Gazette, 1881, p. 473.)

Cases by Dr. J. A. McCreery:

Case 1.—Mrs. G., 40 years of age. Palpitation and shortness of breath on going up stairs, for two years. Loud mitral regurgitant murmur. Pulse irregular and weak. Dyspnoea great on the least exercise. Ordered fluid extract quebracho ℥xxx t. i. d. No appreciable benefit after about $\frac{2}{3}$ ss. had been taken.

Case 2.—Mrs. L., 74 years of age. Very stout—can walk but a few steps at a time, and then only with assistance. Has had several apoplectic strokes, one of which nearly proved fatal. Articulation greatly impaired. Bronchitis since October, 1880, general. Prolonged expiration. Frequent attacks of dyspnoea about 3 A. M., lasting half an hour or longer, during which she has to sit up. Ordered fluid extract of quebracho, ℥xxx t. i. d. No improvement after several days. She refused to continue the medicine on account of its bitterness.

Case 3.—Laborer, 65 years of age. Bronchitis for years, and several attacks of asthma; sibilant and mucous râles over both lungs. Expiration greatly prolonged; cannot lie down. Fluid extract of quebracho, ℥xxx t. i. d., gave much relief and enabled him to sleep part of the night. Failed to report after getting second supply of the medicine.

Case 4.—Mrs. L., 67 years of age. Has had two attacks of bronchitis with asthma. During last three weeks has had severe cough, and for ten days respiration difficult, especially at night. For a week has not been able to lie down. Hoffmann's anodyne and morphine gave only partial relief. Pulse 112. Râles over both lungs; prolonged expiration. Ordered fluid extract of quebracho, ℥xxx, whenever breathing got bad. First dose gave almost complete relief for two hours. Took the drug three nights, always relieving her so that she was able to lie down and sleep. One night took the medicine twice. In this case it is to be noted that improvement had commenced before quebracho was given. Yet the effect of the drug was very striking.

Case 5.—Woman, 70 years of age, suffering from an exacerbation of an old chronic bronchitis. Breathing short and labored; orthopnoea at night. Expiration prolonged. Quebracho gave great relief—enabling her to lie down and sleep. She required one or two doses every night.

Case 6.—A young woman, who had slight attacks of orthopnoea from bronchitis, with some consolidation at apex of one lung. Quebracho seemed to give relief for a time, but the patient was too stupid to give a very clear history.

12.

Report from New York Therapeutical Society. (Therapeutic Gazette, 1881, p. 473.)

Cases reported by Dr. C. W. Packard:

Case 1.—Henry J. K., 39 years of age. Mitral stenosis with hypertrophy; moderate bronchitis; dyspnoea constant; at times orthopnoea lasting through successive days and nights—the patient catching only occasional snatches of sleep in the sitting posture. Administered Squibb's fluid extract quebracho, 3j dose, every four hours. The third dose was vomited, also the fourth. Discontinued the medicine till next day, when it was repeated with the same experience. No effect on the dyspnoea.

Case 2. George W. F., 50 years of age, railroad superintendent, temperate, suffering from hypertrophy with dilatation. Mitral disease suspected, but not made out. Heart's action irregular and at times tumultuous. No evidence of renal disease. Orthopnoea at times, persisting for days and nights, and marked dyspnoea at all times. Fluid extract quebracho, in 3j dose, every four hours, had no apparent effect upon the dyspnoea. At the end of twenty-four hours the medicine was suspended, as it was no longer retained by the stomach.

Both of these patients complained of the nauseousness of the quebracho. And in many like cases its offensive taste must act as a bar to its administration by the mouth.

13.

Report from New York Therapeutical Society. (Therapeutic Gazette, 1881, p. 437.)

Cases reported by Dr. George Bayles:

Case 1.—German, aged 65. Asthma depending upon cardiac disease. Made one visit in April; the patient breathing with marked difficulty and great voluntary effort. Prescribed fluid extract quebracho in ℥xx doses, in water, to be repeated hourly if necessary; was informed the following day that the paroxysm was entirely relieved after taking three doses at a little less than two-hour intervals. All previous attacks had never been of less than twelve hours' duration, and sometimes twenty-four.

Case 2.—Young woman, plethoric, and a free eater. Frequent attacks of nervous dyspnoea, attended with hysterical symptoms. After a hearty dinner indigestion supervened, and alarming dyspnoea. ℥xx doses fluid extract quebracho were ordered hourly till symptoms subsided. After four doses had been taken the patient was entirely relieved of all distressing respiratory symptoms. The completion of digestion may have had much to do with the relief experienced, though I am inclined to regard the quebracho as an important aid; for such prompt relief had never been obtained before under like circumstances.

14.

Report from New York Therapeutical Society; (Therapeutic Gazette, 1881, p. 473.) Cases by Dr.

A. V. B. Lockrow: Case 1.—Mrs. M. came March 2d, to Demilt Dispensary. Had had a bad cough, more or less, for two years—severe during the last summer. Complaints of shortness of breath. Temperature 100°, pulse 80, respiration 30 to 32. Diagnosis: emphysema and bronchitis. Gave her cod liver oil with spir. æther. comp.; also fl. ext. quebracho, gtt. xxxt. i. d.

March 7th.—Patient much relieved. Temperature 99°, pulse 80, respiration 28. Cough better.

Case 2.—Patrick D., 70 years of age, came to

Demilt Dispensary, May 9th. Plasterer by trade, sick three months. Short of breath for several years. Cough at present severe. No appetite. Pulse very irregular and weak. Diagnosis: asthma; emphysema, and bronchitis, with cardiac hypertrophy. Has frequent and severe attacks of asthma, and cannot sleep. Gave fluid extract quebracho \mathfrak{M}_{xxx} t. i. d. Also infusion digitalis \mathfrak{z} ss. twice a day.

May 11th.—Patient very much improved. Slept well after taking first dose—for the first time since December 13th. The improvement is very marked. Pulse still irregular, but fuller and stronger. After taking fourth dose of quebracho, took food with a relish for the first time in several weeks.

15.

Report from New York Therapeutical Society. (Therapeutic Gazette, 1881, p. 475.)

Cases of Dr. R. T. Bangs, House Physician, St. Luke's Hospital (service of Drs. A. H. Smith and G. G. Wheelock):

Case 1.—J. O., 28 years of age. Spasmodic asthma. Had used iodide of potassium, stramonium, nitre papers, nitrite of amyl, belladonna, chloral, etc., without much benefit. Fluid extract quebracho, \mathfrak{M}_{xx} , were administered, t. i. d., and afforded immediate relief—so much so, that the patient left the hospital in a few days, provided with a prescription for the drug.

Case 2.—42 years of age. Aortic aneurism. This was a man upon whom treatment with an Esmarch bandage was twice employed, under ether, for the cure of a popliteal aneurism. The first time the bandage was left on for an hour and a half, and the second time for two hours. After the bandage had been removed a tourniquet was each time applied to the femoral artery for an hour. Both these attempts proved unsuccessful. Treatment by flexion was next tried, but was also of no avail. Finally ligature of the femoral cured the popliteal aneurism. While the patient was under ether it was noticed that he was very cyanotic, but when the effect of ether had passed away the cyanosis also disappeared. Ten days after the femoral had been ligated the patient developed dyspnoea. Fluid extract of quebracho was given, \mathfrak{M}_{xv} t. i. d., and gave much relief. He remained in the hospital twenty-seven days longer, during which time the quebracho continued to benefit his dyspnoea. Fifteen days later he was readmitted with some dyspnoea; \mathfrak{z} ss. t. i. d. relieved him again. After taking it for two weeks the use of the drug had to be stopped because no more of it could be obtained. For a fortnight he took other remedies with but little and temporary benefit. At the end of that period the use of quebracho was resumed, \mathfrak{z} ss. t. i. d. By this time the patient was markedly cyanotic, and his dyspnoea was almost continuous. The dose was increased to \mathfrak{z} ss. every four hours, but no benefit resulted. The patient died, and at the autopsy a large aneurismal tumor was found pressing upon the trachea, very much narrowing the lumen of that tube.

Case 3.—H. B., 48 years of age. Spasmodic asthma of many years' standing. Fluid extract of quebracho, \mathfrak{z} ss. t. i. d., was at once prescribed, and gave marked and permanent relief.

Case 4.—F. L., 70 years of age. Cardiac disease. Fluid extract of quebracho, \mathfrak{z} ss. t. i. d., given with some slight benefit. Patient died ten days after the administration of the drug had been begun.

16.

Report from New York Therapeutical Society. (Therapeutic Gazette, 1881, p. 475.)

Cases observed by Dr. A. H. Smith:

Case 1.—Mrs. C., aged 65. Long-standing mitral regurgitation, with pulmonary oedema and

hydrothorax; orthopnoea; respiration very rapid and catching; lips livid. Two doses \mathfrak{M}_{xl} Squibb's fluid extract quebracho were given without any noticeable relief. So much nausea was caused by the medicine that its use was abandoned. In this case digitalis had ceased to give relief.

Case 2.—C. H., male, 36, patient at Presbyterian Hospital. This was a case of asthma, complicated with old pleuritic adhesions and with a recent attack of acute articular rheumatism. The dyspnoea came on in paroxysms of great severity. When the first dose of quebracho was given, March 10, 1881, the patient was sitting up in bed, his face purple, lips livid, breathing very labored, shoulders elevated with each inspiration. \mathfrak{M}_{xl} of Squibb's fluid extract were given, and in fifteen minutes there was perfect relief, which lasted, however, only twenty minutes, when the difficult breathing returned. Another dose was then given, from which complete relief was obtained, lasting an hour. For the next twenty-four hours the attacks were less severe. On the following day, March 11th, the dyspnoea not being urgent, a dose of \mathfrak{M}_{xl} was given, and the effect upon the respiration was observed. In fifteen minutes it had fallen from 27 to 20. At the time of these observations the patient was taking gr. x of salicylic acid, and \mathfrak{z} ss of dialysed iron, t. i. d. The dyspnoea not recurring, the quebracho was discontinued.

17.

Report from New York Therapeutical Society. (Therapeutic Gazette, 1881, p. 575.)

Cases reported by Dr. L. E. Holt, of Bellevue Hospital:

Case 1.—Cancer of the breast; secondary deposits in the lungs; old pleurisy with adhesions. Female, aged 53. Constant dyspnoea, which was increased paroxysmally, and so severe at night as almost to preclude sleep. I have special notes of only three nights in which the quebracho was used. March 18th. Two \mathfrak{z} ss. doses were given at bedtime, when she was breathing with great difficulty. Improvement was noticed in a short time, and patient said next morning she got great relief from it. 19th.—Two doses, one hour apart, with same result. 20th.—Very marked improvement noticed by nurse after second dose. Respiration fell from 40 to 28, and patient went to sleep. During her stay in hospital, one week longer, quebracho was used, always with relief.

Case 2.—Bronchitis (chronic) and spasmodic asthma. April 5th.—Female, 60. Breathing so badly that she could not lie down or go to sleep. No relief till the second \mathfrak{z} ss. dose was given; then the breathing was noticed to be much easier. Fell asleep, slept for an hour. The third dose was then given, and patient slept well the rest of the night. Left hospital next day, and the drug was not used further.

Case 3.—Acute pneumonia followed by infarction. Male, 45. Quebracho was given at the very inception of the disease, before the physical signs of pneumonia appeared. March 24th.—Marked dyspnoea, and complaints of sense of suffocation. Three \mathfrak{z} ss. doses gave complete relief, lasting several hours. 25th.—The drug given without any effect whatever, and it was discontinued. Patient died two days later.

Case 4.—Pleuro-pneumonia of left side; dry pleurisy of right. Female, 35. Respirations quick and very labored. Three \mathfrak{z} ss. doses gave very marked relief, lasting about eight hours. Patient died a day or two later.

Case 5.—Bronchitis, emphysema, and asthma. Male, 64. Breathing habitually labored. No paroxysms of marked severity. Quebracho given two nights, three doses, \mathfrak{z} ss. each, without perceptible benefit. Discontinued.

[The notes of the following three cases were furnished by Dr. William B. Anderton, House Physician Third Medical Division.]

Case 6.—Male, 38. Bronchitis, emphysema, and asthma, the latter being almost entirely paroxysmal, and the paroxysms being of extreme severity. On three occasions quebracho was given in 3 ss. doses every half-hour for two hours, without the slightest benefit. Nearly the whole list of antispasmodics was gone through with, and nothing but morphia was found to do any good.

Case 7.—Male, 54. Bronchitis, emphysema, and asthma. Paroxysms marked, but less severe than in the case just related. Two 3 ss. doses, given at bed time, gave him complete relief, which lasted all night. This was repeated a number of times, always with the same result.

Case 8.—Male, 47. Bright's disease; bronchitis; pulmonary oedema with very great dyspnoea. Whisky and digitalis were given without any benefit. When quebracho was added, given in 3 ss. doses every half-hour for two hours, marked improvement took place after the second or third dose, the improvement lasting five or six hours. As the patient was then growing worse, the quebracho was repeated as before, with a like result. In five or six hours more it was again repeated, with benefit. Cardiac stimulants were kept up throughout the whole time, so it is impossible to say exactly how much of the improvement was due to the quebracho. This patient is still in the hospital, and doing well.

In this connection I would remark that three cases were reported in the "Medical News and Abstract" for May, 1881, of the successful use of quebracho, by a distinguished member of the Therapeutical Society, Prof. Austin Flint, Sr., in his service at Bellevue Hospital.

In the first of these cases, one of aneurism of the ascending arch to the aorta, cardiac hypertrophy, and great dyspnoea, iodide of potassium was given till symptoms of iodism appeared, without relief to the patient. \mathcal{U} xxx fluid extract quebracho were administered every three hours. After the second dose, complete relief of dyspnoea was experienced, the pulse fell from 100 to 86, and the respiration, which had been hitherto hastened, to its normal frequency. During the two weeks following, while he remained in the hospital, several recurrences of dyspnoea were as speedily relieved.

18.

Report from New York Therapeutical Society. (Therapeutic Gazette, 1881. p. 437.)

Cases reported by Dr. J. F. Duffield, Presbyterian Hospital (service of Drs. Burrall and Castle):

Case 1.—J. T., male, 29. Catarrhal phthisis, third stage. March 20th.—Dyspnoea excessive. Fluid extract quebracho, \mathcal{U} xl, given at intervals of one hour (three doses), without appreciable effect, either on pulse or respiration. 22d.—Patient died.

Case 2.—C. P., male, 28. Intermittent fever, quotidian; old pleurisy; and spasmodic dyspnoea (an opium-eater); \mathcal{U} xl quebracho given during the attack. Respiration, at time, 32; fifteen minutes later, 36; one hour later, when second dose was given, respiration 34; fifteen minutes later, 38. Pulse also rose, but record lost.

Case 3.—J. P., 60, male. Fatty heart; general oedema. Taking gr. 1-20 strychnia sulph. t. i. d.; $\frac{3}{4}$ ss infusion digitalis also. June 10th.— \mathcal{U} xxx fluid extract quebracho given him at 11 A. M. Pulse 60, respiration 44. In 20 minutes pulse fell to 56, respiration 32. Dose repeated at 1 P. M., with pulse 46, respiration 36; twenty minutes later, pulse rose to 48, respiration unchanged. At 3.30 P. M., 30 minims more were given, with pulse 48, respiration 38. Fifteen minutes later pulse unchanged, respiration 36. 11th.— \mathcal{U} xl were given at 11.45 A. M. Pulse 54, respiration 38. In fifteen minutes, pulse 52, respiration 36. At 2.40 P. M.,

medicine repeated, pulse 52, respiration 38; fifty minutes later, pulse 56, respiration 36.

Case 4.—L. G., 36, Ireland, seamstress; catarrhal phthisis, second stage; chronic bronchitis. Unable to take opiates. Treatment: stimulants, tonics, and cough-mixtures. Was put on fluid extract quebracho, \mathcal{U} xl every three hours, for twenty-four hours. All cough-mixtures, etc., stopped. It had the effect of lessening respiration 3 to 8 a minute, and rendering the breathing much easier for the whole period. Vomiting the last dose.

19.

NOTE.—A series of careful and most satisfactory tests of quebracho in dyspnoea, numbering more than thirty cases, have been made by Dr. George M. Tuttle, House Physician at the New York Hospital (service of Dr. W. H. Draper, a member of this Society.) The results will doubtless be given to the profession at an early day.

EXPLANATION OF PLATE I.

Fig. 1. Flowering twig of *Aspidosperma Quebracho*, Schlechtendal.

Fig. 1 a. Single flower.

Fig. 1 b. Corolla, opened and spread out.

Fig. 1 c. Ovary.

Fig. 2. Quebracho bark, b. cortical layer, r. inner bark.

Fig. 3. Specimen showing inner bark light colored.

Fig. 4. Upper external part of the bark.

Fig. 5. Transverse section of the cortical layer.

p. parenchyma, k. cork bands, sk. sclerenchymatous cells.

EXPLANATION OF PLATE II.

Fig. 6. Transverse section of inner bark.

Fig. 7. Group of stone-cells in the inner layer.

Fig. 8. Fiber of Sclerenchyma, enclosed in the crystal sheath.

Fig. 9. Longitudinal section of a fibre.

Fig. 10. Transverse section through the fibre and its sheath.

Fig. 11. The same after treatment with hydrochloric acid and removal of the crystals, showing empty cells.

Fig. 12. Longitudinal section through the bark of a twig of *Aspidosperma Quebracho*. Young sclerenchyma-fibre with crystal-sheath in process of formation.

Figs. 13-14. Transverse section through a young sclerenchyma fibre and its neighboring cells, showing the gradual formation of the sheath.

Fig. 15. Transverse section through a one-year-old twig of *Aspidosperma Quebracho*. b. secretory ducts, sf. primary sclerenchyma fibres, m. s., medullary sheath.

EXPLANATION OF PLATE III.

Fig. 16. Transverse section through wood and bark of an older twig of *Aspidosperma Quebracho*.

Fig. 17. Section through bast portion similar to the one represented in fig. 15 with secretory (oil) ducts, b.

Fig. 18. Transverse section of the wood of *Aspidosperma Quebracho*.

Fig. 19. A part on of same more highly magnified.

Fig. 20. Part of an isolated wood-fibre with bordered pits.

Fig. 21. Cell of the medullary ray.

Fig. 22. Chambered cell of the medullary ray containing crystals.

Fig. 23. Isolated parenchyma-cells of the wood with their protuberances.

Fig. 24. Transverse section through a twig of *Aspidosperma Quebracho* about three years old, with triangular pith.

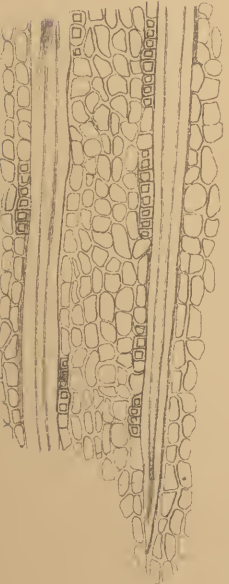
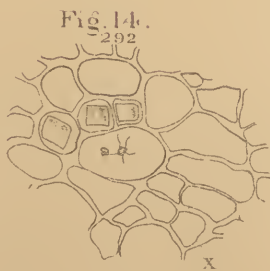
Fig. 25. Transverse section through pith and medullary sheath more highly magnified.

The value below the number of each figure designates the microscopic enlargement.



Fig. 5
65



Fig 6.
65Fig. 7
140Fig. 8.
100Fig. 9.
100Fig. 10.
292Fig. 11.
292Fig. 13.
292Fig. 12.
110Fig. 14.
292Fig. 15.
52

